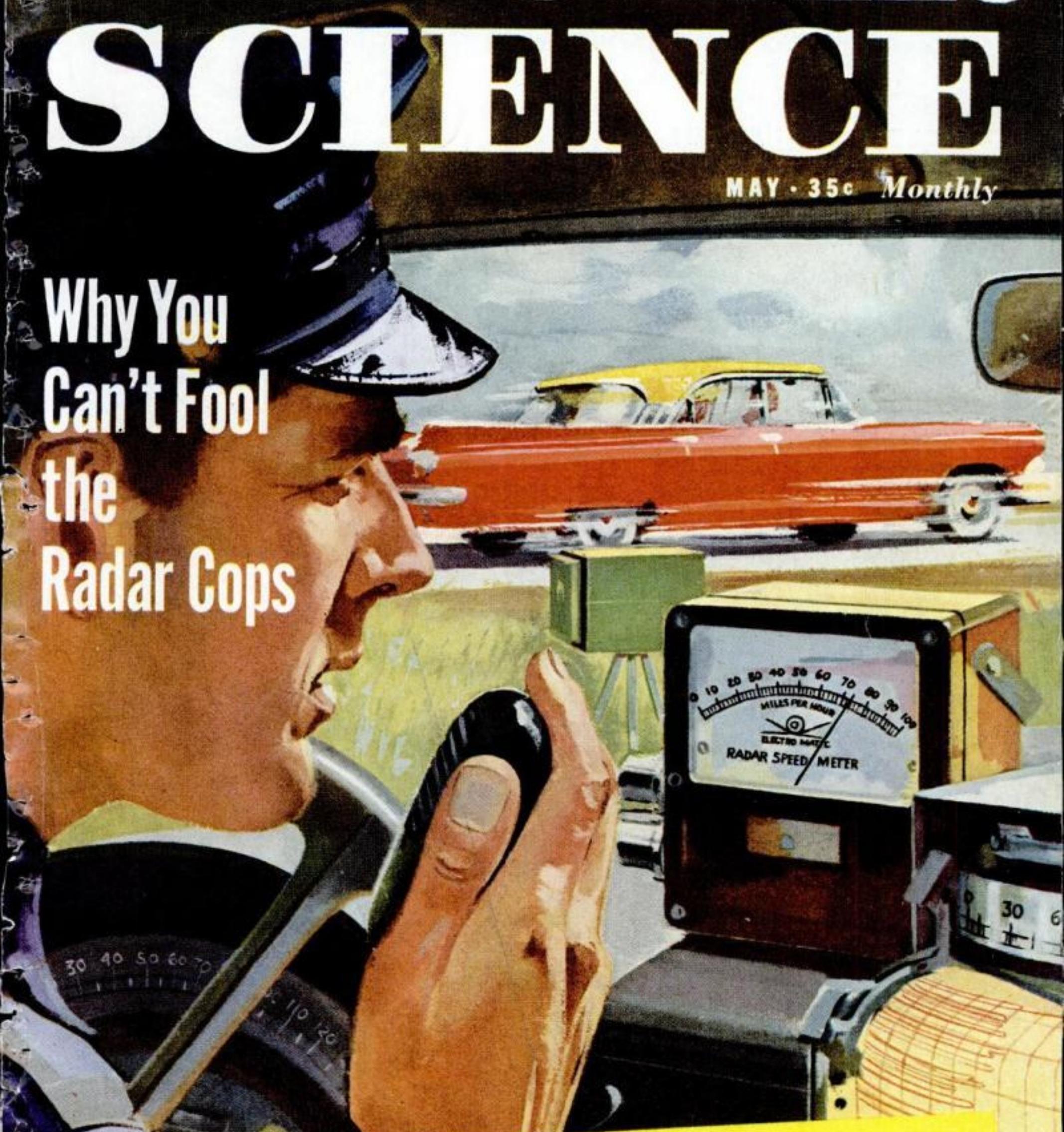


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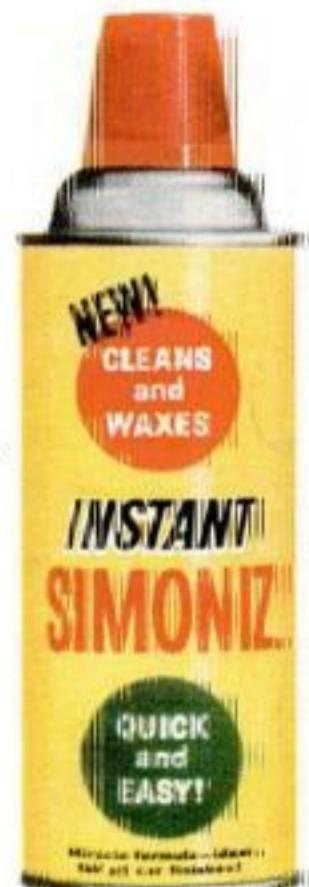


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PAGE 98

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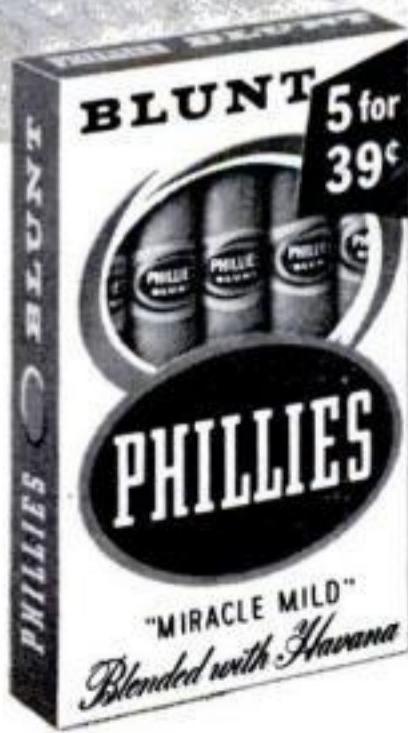
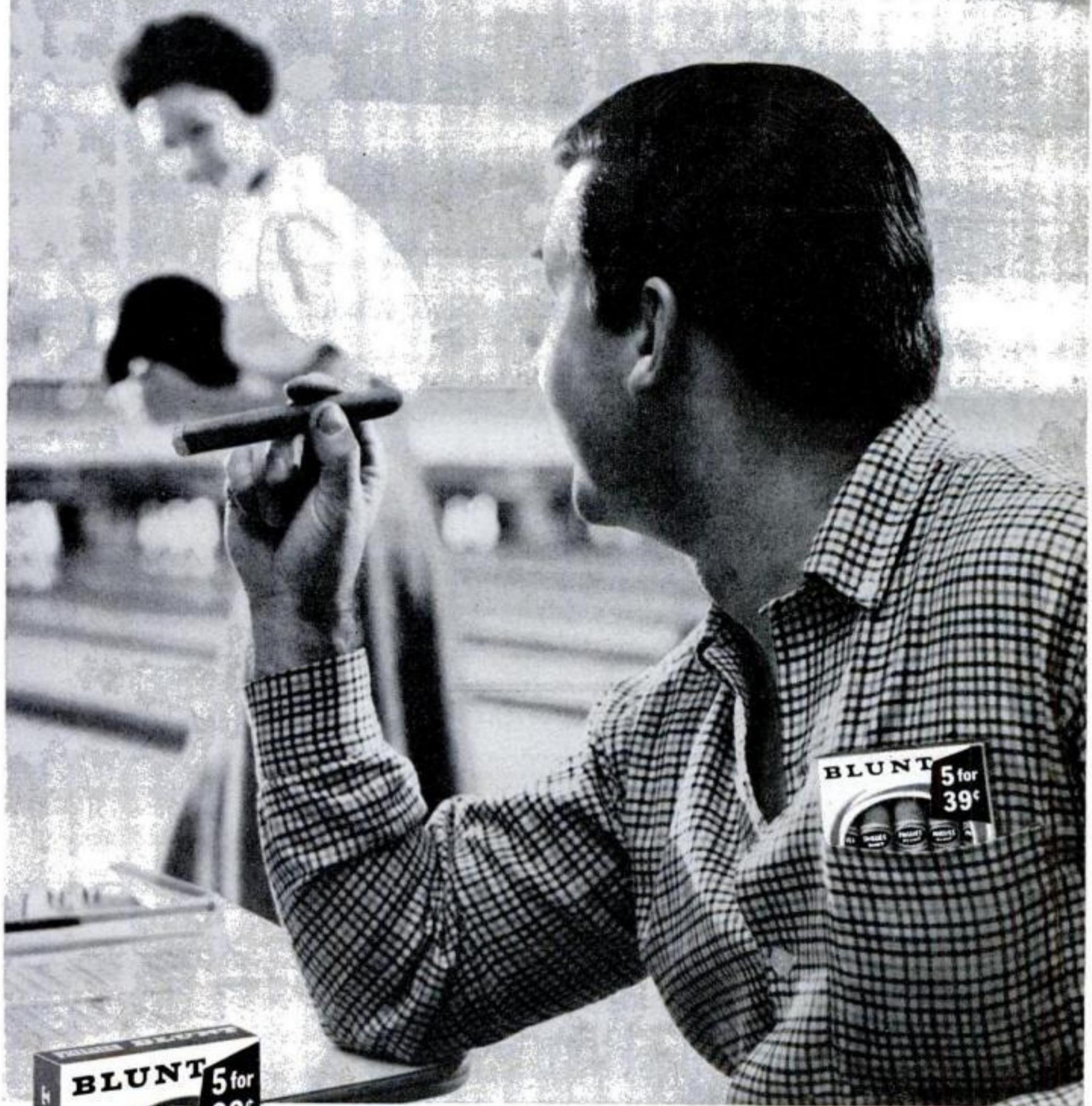
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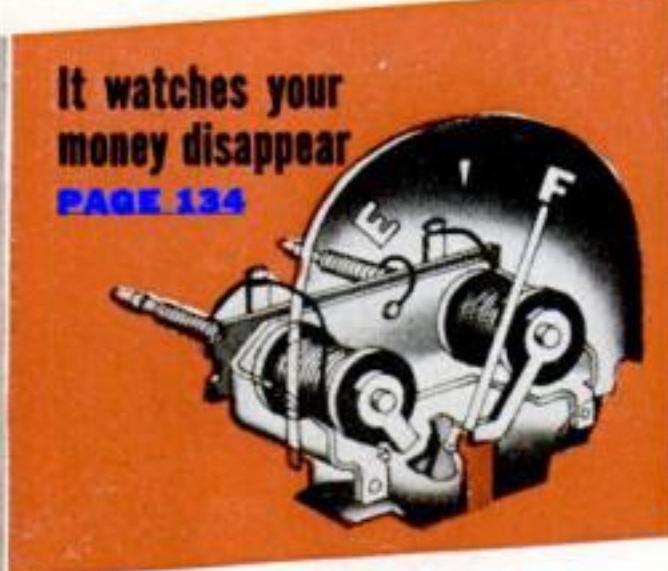
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human beings?
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Popular Science

May, 1959

Cover painting by Arthur Shilstone

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Magazine for 87 Years*

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Advertising Manager LEE P. ADAMS

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PS Readers

TALK BACK



Don't Sweat—You've 730 Years

I LIKED "Boosting Your Output of Good Ideas" [Jan.] so well that I gave it a try, applying the formula to another article, same issue: "Babies to Order." It considered the population problem—which must be solved within the next 730 years unless we all plan to play footsie in the one square foot of space we'll be allotted by then.

I attacked this "most urgent and most critical problem facing the world" by applying the first of your seven tips to trigger good ideas: Can it be done backwards, upside down, inside out? I've been so fascinated by this one that I haven't been able to get on to tip two, but will keep you informed.

H. L. LEWIS, Blanchester, Ohio.

Those Aluminum Engines

MAY we congratulate you on the thoroughness and accuracy of "Here Come the Aluminum Engines" [Feb.]. Having produced more chrome-plated aluminum engine cylinders than anyone else in the U. S., we'd like to add a point on that \$4 figure for chrome-plated cylinder bores.

There is adequate evidence that chrome plating extends cylinder life as much as three times over the cast-iron cylinder wall. But this excellent wear pattern can only be achieved by producing a superior lubricating surface. We are now producing a spongy chrome plate that is outperforming the old type and will allow chrome plating of cylinder bores for a fraction of the \$4 cost you mention.

LOUIS W. RAYMOND, Pres.
The Superior Plating Co.
Fairfield, Conn.

. . . Our local garageman is restoring a 1914 Abbott Detroit. Its six-cylinder engine is aluminum except for pistons and head and, considering age and mileage, the block shows little wear. Why the heat-transfer problem now if they had it whipped more than 45 years ago?

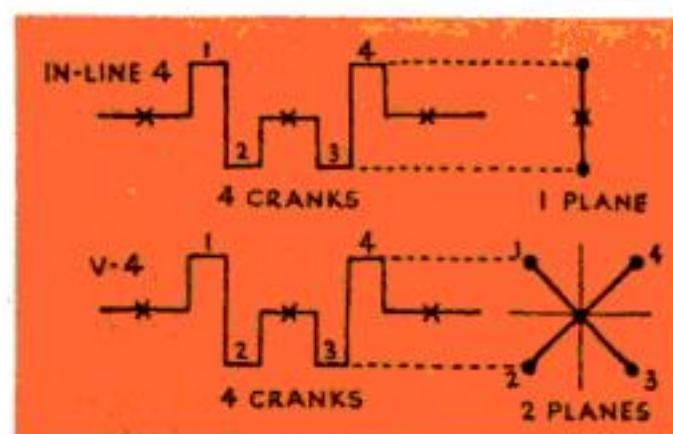
I'll concede that the antique had a lower r.p.m. figure than most present-day engines, but it had plenty of power and the speed was practically as high. In fact, with most states enforcing speed laws, it would run the legal limit.

HAROLD WILEY, Douds, Iowa.

. . . In your aluminum-engine piece, you stated that the in-line four-cylinder is used more than the V type because it has only two "throws" while the V type has four. Doesn't the V type have only two, and the in-line four?

D. R. HEGBURTH, Bensenville, Ill.

The in-line requires four throws in one plane and the V-4 four in two planes. This sketch of the two types was drawn



for POPULAR SCIENCE by American Motors engineers.

They Remember When . . .

LOOKING through old issues, I saw a little piece on afterburners for cars ["The Month in Science," Nov. '58].

When I was a teen-ager, I made an A/B for my old car. I used two spark plugs fitted 24" in from the end of the exhaust pipe. Then I revved the engine, turned on my Model T coil to give juice to my plugs, and what happened? My dad's car, parked behind mine, needed

I saw my job failure in my family's eyes



... but how they smiled when I.C.S. pulled me through

Take it from me. That's the hard way to discover a mistake.

I thought I was in solid down at the plant with my years of experience. They'd never lay me off.

But they did. And I was in solid—as long as business was good. But when things started getting tight . . .

"In times like these," the boss told me, "everybody has to pull his own weight and a little more. Experience is more than just adding up years. You have to learn something, too."

I was sore, sure. But when I calmed down I realized he was right. I decided then to start learning. I signed up for an I.C.S. Course, studied at home in my spare time.

Then I went back to the plant. The boss was so impressed with my I.C.S. diploma, he gave me another try . . . and soon after I even got a raise!

TRAINED men are in demand

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the fender repainted due to a very beautiful, eight-foot-long, bluish-yellow streak of flame.

I'd like to point out that an aircraft with an A/B does not burn the unused fuel, as you say. It burns unused air (60 percent left from engine) and pumps in fuel from the engine, thus adding more thrust. It's a bit more than "gaining a little added power."

On an F-94B (now obsolete in the AF), the engine—turning at 100 percent at sea level—uses about 12 gallons per minute. Fuel consumption of the burner, when engaged, is about 38 gallons per minute, bringing total consumption of jet fuel to 50 gallons per minute.

T/Sgt. JOHN TAYLOR, Ogden, Utah.

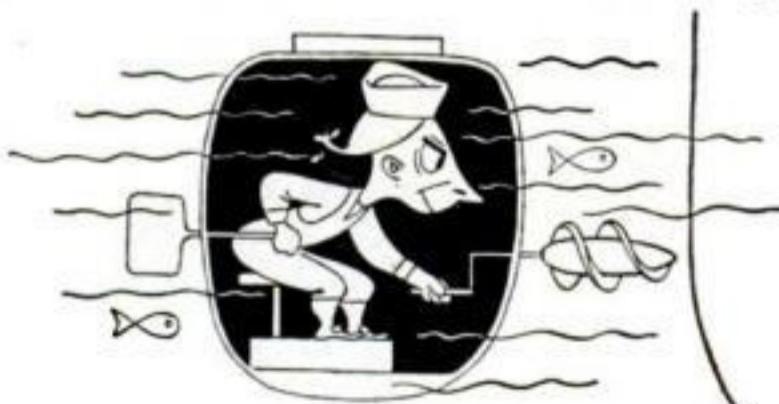
. . . Reading about Charles F. Kettering's invention of the electric starter in 1910 [Feb., p. 90] reminded me of the car I was driving then. A 1910 Italian Scat, it had a unique starter that worked on compressed air. A small cylinder in front of the motor compressed air in a tank under the frame, and copper tubing shot the air into the engine's cylinders through a circular distributor. It worked perfectly.

H. E. BROUTIN, San Diego.

Spirit of '76 Reborn

I WAS amused to see that warships may soon double their speed with spiral, one-bladed propellers [Jan., p. 133].

During the American Revolution, David Bushnell built a barrel-shaped



submarine fitted with hand-propelled screws of this very design. With them, he attempted to bore a hole through the copper-sheathed bottom of a British warship so that he might attach an explosive charge.

DAVID SEGAL, Philadelphia.

Skidding Down the Mountain

MAY I add a few points to "What We Know About Skidding" [Feb.]? Have

WHAT HAPPENS WHEN A MAN DECIDES TO DO SOMETHING! ABOUT HIS FUTURE!

The proven rule of "learn more to earn more" took M.E.F. (name on request) from a position of truck driver to that of an accounting executive in sixteen months. Listen to what M.E.F. says:

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M.E.F. took a proved road to success—and his letter is typical of the thousands we have in our files from men and women in all walks of life.

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you noticed that as long as your rear wheels turn, your car will not slew sideways? To stop quickly, I feed more gas to allow for error and with left foot toe the brake. This way, both wheels turn at the same speed and won't slew. True, you may lose the front end; but to change direction, release brake and gas until new direction is obtained, then proceed.

I've gone down steep mountains and around slick curves in this manner with no rear chains. Better still, use the hand brake, which affects only the rear wheels, leaving the front wheels to turn. Try it on dry ground, then on gravel roads and, when experienced, on ice. In going around corners fast, use both brake and throttle—together or intermittently.

I still haven't figured out how to control a power skid going uphill on ice.

C. E. SEYDELL, Wichita.



... Your chart on tire performance indicates that driving traction on ice is best with standard tires carrying reinforced chains. But what really intrigued me was the combination in second place: standard tires used with sanders.

Is there a driver-operated sander that spouts sand in front of skidding rear wheels? And how is the sand kept dry and fluid enough for quick and unhindered flow? The only sander I know is the bucket I carry in my car trunk. The sand stored in this seems to pack.

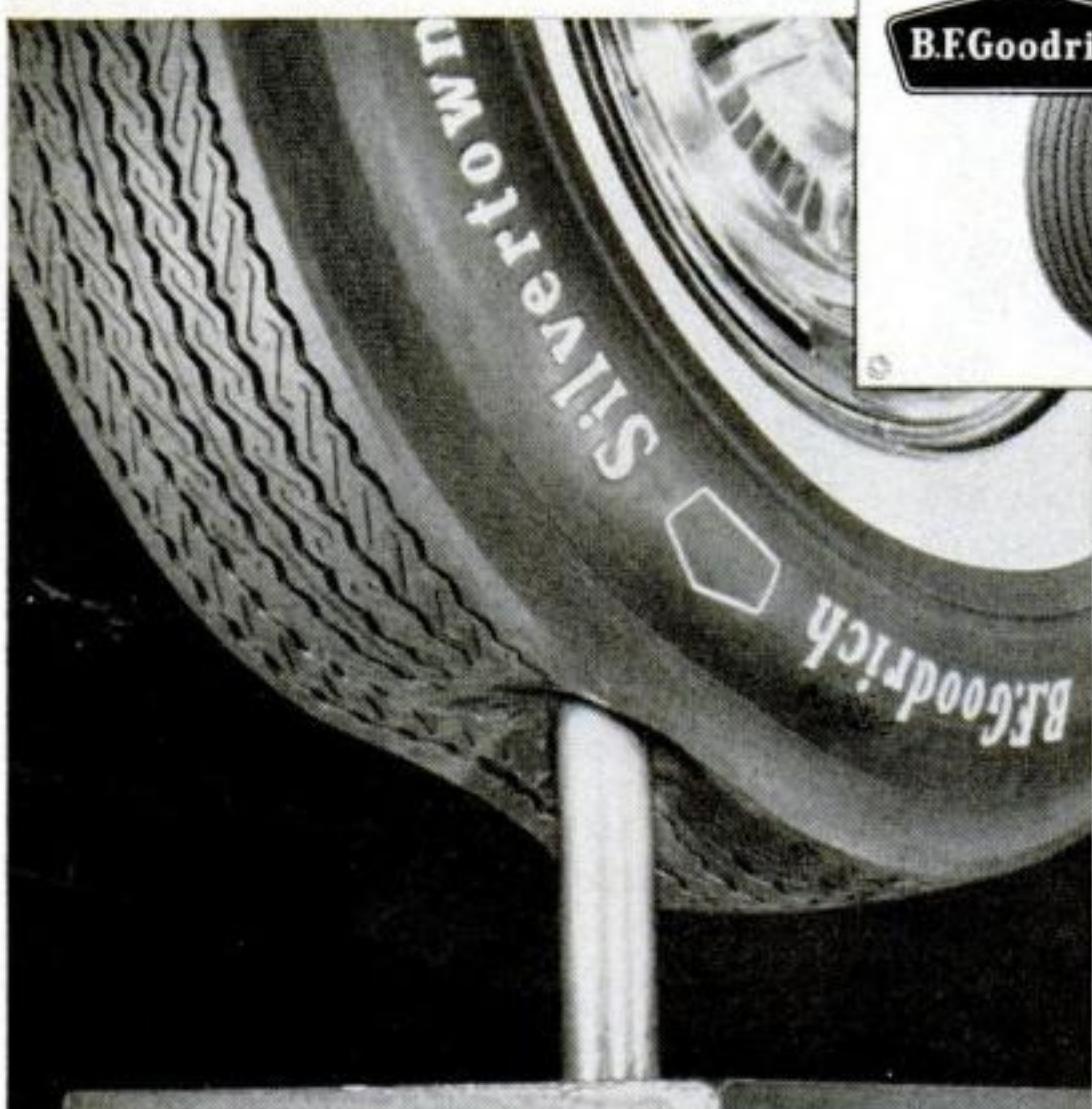
O. E. FOLDVARY, Lake Bluff, Ill.

These sanders, widely used on trucks and buses, are sold as accessories for passenger cars in auto-supply stores and mail-order houses. They are not truly automatic: You press a lever on the steering-wheel column to operate electric valves in twin hoppers, mounted in the trunk over the rear wheels. The hoppers contain a special "grit," which is less likely to clog than ordinary sand.

Tracking Down Tracking Error

WHEN reading about tone arms ["Hi-Fi Buyer's Guide," Feb.], I was amazed

Stop at the sign of the Smiling Tire

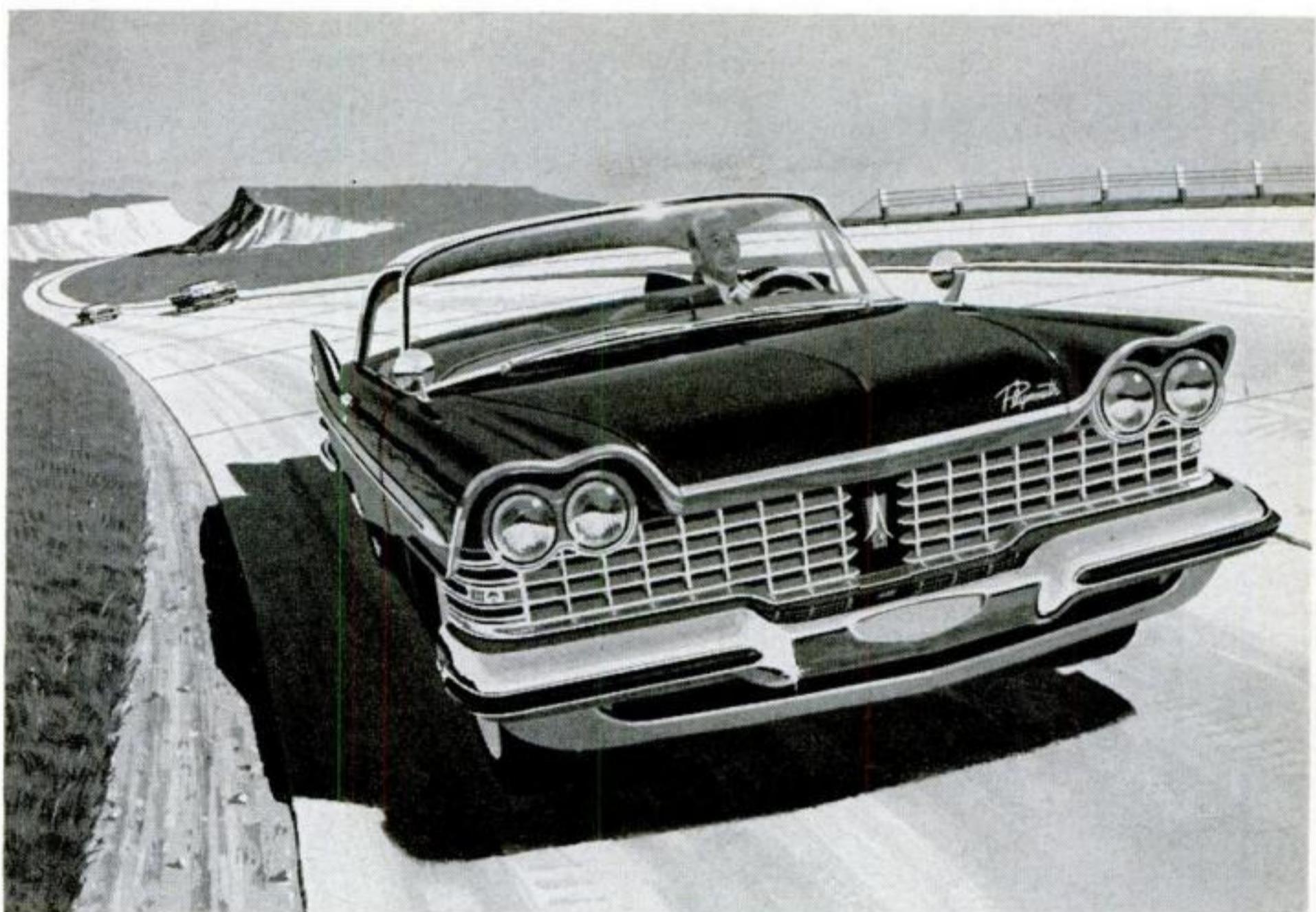


Ouch! This 6" stub tests tire strength. Bruising impact—but no tire failure! Assures greater safety when you drive over curbs, chuck-holes, railroad tracks.

Relax! Drive worry-free on B.F. Goodrich Silvertowns. They are lab-tested, road-tested, time-tested. We do the worrying for you! So have fun. Enjoy trouble-free mileage on the quality tires chosen for new cars year after year. Get top value, get Smileage! 4 tires, \$4 down!

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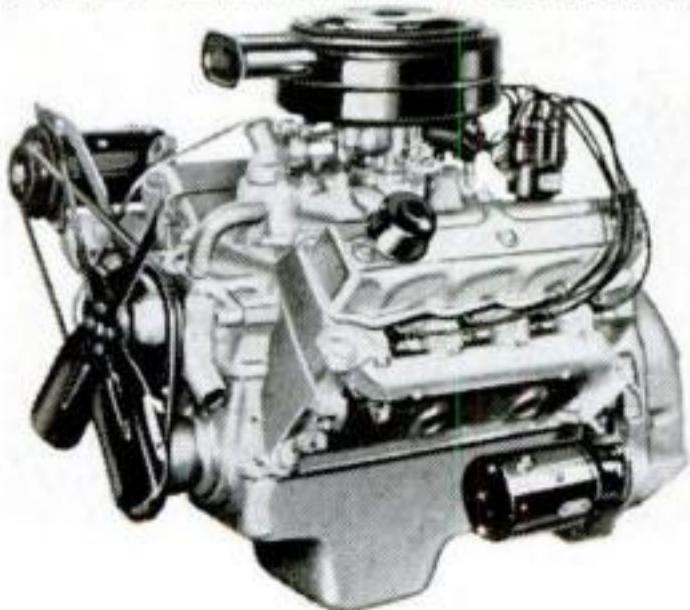


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Don't take our word for Plymouth's *economy*, either. It has been thoroughly documented in tough competitions. Today's standard Plymouth V-8s save extra gas with new Fuel-Saver Choke plus new 3-stage Carburetor.

As for Plymouth's *ride*, it's Torsion-Aire, yours at no extra cost. There's nothing to compare with it in the low-price field... for smoothness, for minimum of sway or roll, for level-keel cornering, for freedom from dive on stops. And Plymouth's extra roominess inside assures you of the sort of *comfort* you've never before associated with low-price cars! Why don't you ask your Plymouth dealer for the Two-Mile Try-Out that will prove to you what a big difference Plymouth's great engineering makes!



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'59 Plymouth

to be fully appreciated, must be driven

by your statement that a bent or offset arm will have less tracking error than a straight one.

This tracking error must be figured from a line drawn through the stylus and the pivot point. Bending the arm in or out, or even coiling it around the record and back again, will have no effect on tracking error, so long as the stylus remains the same distance from the pivot. The only advantage in a curved arm is that it is easier to get it out of the way when changing records.

A. W. CORNUTT, Seattle.

It is not true that the tracking error that causes distortion is measured to a line joining pivot point and stylus. As the article pointed out, the tracking error is the angle between the axis of the pickup and the tangent to the record groove. It's the combination of overhanging the stylus past the record center and offsetting the arm that cuts tracking error.

How to Start a Nail

ONE of your Short Cuts [Feb.] advises one to square the point of a common

nail to prevent splitting. I find this is not necessary if you know how to start the nail.

Examine the point of a common nail and you'll find that it has four flat sides

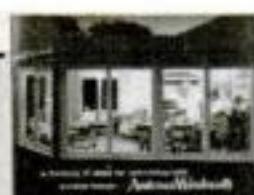


and four corners. Two of the corners are quite smooth. Start the nail with these crosswise of the grain and they'll act as a wedge, tending to spread the grain. But if you start the nail with the rough corners crosswise, they'll cut their way through the wood and are much less likely to split the board.

GEO. TOMPKINS, Tillicum, Wash.

Mercury a Bad Actor

PUTTING drops of mercury in the terminals of your car's distributor ["Hints from the Model Garage," Feb.] can lead



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- Adds Sales Slips & Grocery Tapes

IT'S HERE at last from Germany—the new 1959 high-speed WIZARD Calculator. Barely larger than a pack of cigarettes. Yet it's precision made with enduring Korium Steel working parts. This new, high-speed model now subtracts and adds up to ONE BILLION—never makes a mistake! And now—for the first time ever—it has a fitted MAGIC RECKONER for multiplying and dividing INSTANTLY—without paper or pencil. Yet this complete, high-speed calculating system can now be yours for HALF PRICE—only 1.98—direct from importer to you!

Just Feed it Your Number Problems and the answer pops up—automatically

This new 1959 high-speed calculator is so easy, so simple to use. All you do is "feed" it your list of figures, small or big, and instantly the correct answer pops up in the 9 tiny windows—AUTOMATICALLY! For multiplication or division use the MULTI-RECKONER and get lightning fast answers. For instance, you divide 39 into 1872—you get the answer in less than 2 seconds! Or multiply 43 by 47 and get your answer (2,021) in just about ONE second. No other pocket adding machine gives you this wonderful plus feature! Other machines costing \$3.98 just add up to one million. The WIZARD costs only 1.98 and adds up to 1000 times more—up to ONE BILLION.

SAVES Time, Work, Money For Entire Family

This new 1959 high-speed WIZARD saves the entire family time,

- Fitted Vinyl Wallet Case ➤
- Lightning Clearing Lever ➤
- Fast, Smooth Operation ➤
- Enduring Steel Mechanism ➤

work, money. Avoids frazzled nerves. Prevents costly human mistakes—because this mathematical marvel can't make a mistake! Adds mountains of numbers in MINUTES—instead of hours. Now it's so fast, so easy to check all purchases, statements, even restaurant bills. Keeps a running tab of market purchases as you take food off shelves. Records car mileage. Helps you maintain a budget, figure out your income tax, check children's homework, keep bridge and canasta scores, figure discounts, insurance and stock dividends, salesmen's expenses. The 1959 WIZARD gives you freedom from figuring slavery. Lets you perform scores of everyday adding, subtracting, multiplication and division jobs, easily without any mental fatigue—without silly mistakes... in just seconds!

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The WIZARD is a mechanical marvel developed by German Mathematicians. Human beings can make mistakes, but this machine NEVER DOES! Precision made with genuine Korium Steel mechanism—no gears, no wheels to wear out... virtually lasts a lifetime! That's why over 4,000,000 men, women, even children use this very same type calculator today in business... in the home... even in government work thruout the world! Four million people can't be wrong! Mail coupon below for 10 days FREE trial. You must be 100% satisfied or YOUR MONEY BACK!

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The NEW 1959 WIZARD is the world's only adding machine with the Magic Reckoner. This plus feature lets you multiply and divide too with amazing speed. You pay not 3.98 or 4.98 but only 1.98 for this deluxe WIZARD with fitted VINYL case. Wonderful value, indeed! That's why more WIZARDS are sold than any other pocket adder made.

Now add your purchases as you take them off the shelves. You know how much you're spending as you go along. Check-out counters are crowded. And you know how fast the clerks tally your purchases. Everybody's human—everybody makes mistakes. Know your bill BEFORE the clerk has punched a single figure on the register!



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**"FIRE UP" AT
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POWER TIP**

— the spark plug that cleans
itself while you drive!



to trouble. Mercury attacks brass and corrodes it like nothing else.

Many years ago, pistol and rifle cartridge primers containing mercury fulminate were used, then discontinued. When fired, they released free mercury which attacked the brass case to such an extent it could be crushed with the fingers, rendering it useless for reloading.

G. E. LEMMON, University City, Mo.

He Dreams About Us

SOME time ago, I had a dream about a "talking magazine" which has stuck with me.

Why can't you print a recording in the magazine, something like the discs on breakfast-food cartons? Articles could be accompanied by sound effects of new



machines, motors, rockets and so on. They might be printed on a plastic material you could tear out and paste over an old record for playing.

PHILEMON SMITH, Ft. Wayne, Ind.

Matter of fact, we've looked into doing something like this but found it, so far, too expensive.

Spots Before Our Eyes

You'd better take another "Close Look at Chrysler's Simca" [Feb.]. Your reporter says: "In fourth, which is straight through to the 44.4:1 rear axle, I found myself accelerating on moderate grades." Accelerating up the side of the Washington Monument, no doubt!

EDWARD HERTFELDER, Philadelphia.

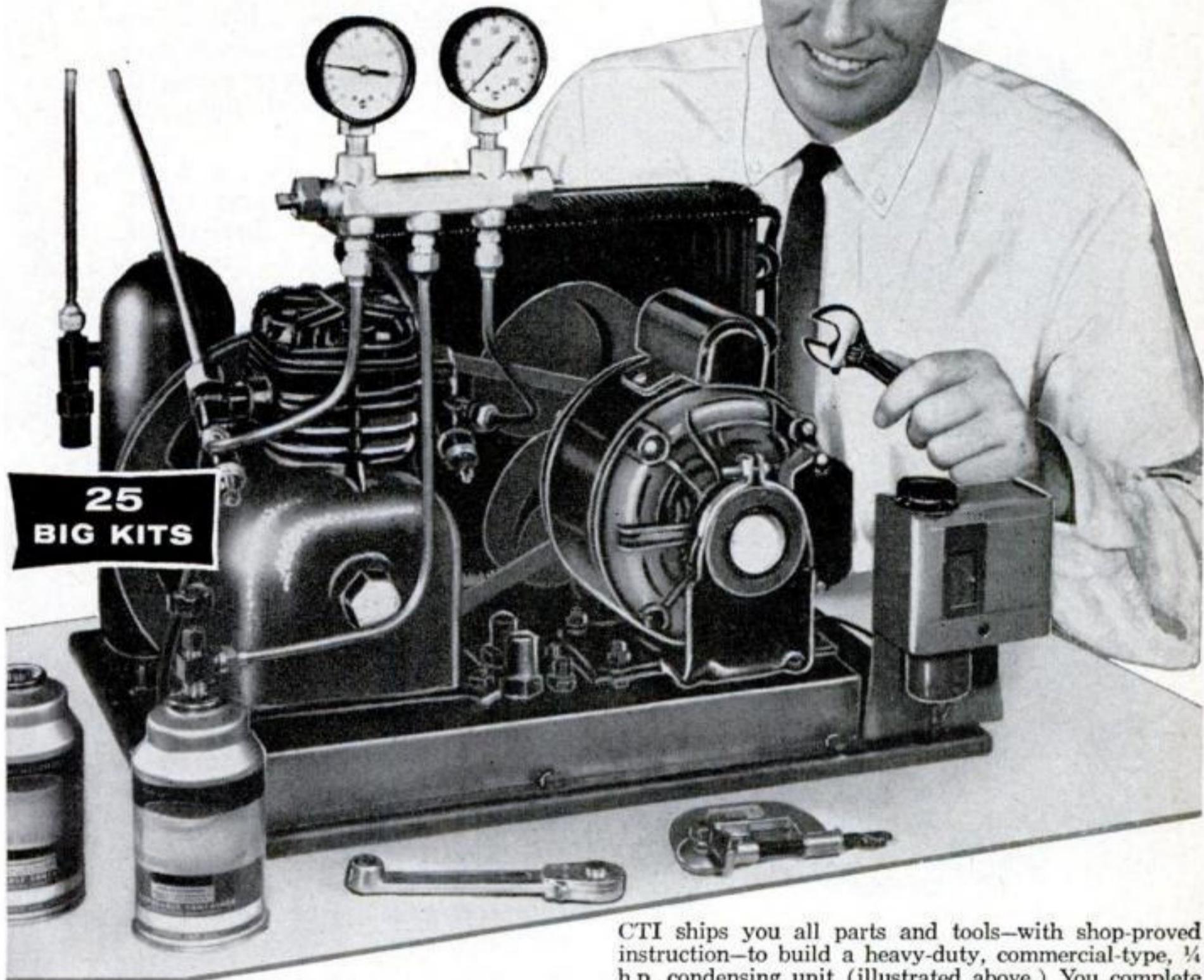
A decimal skidded; the ratio should have read 4.44:1.

Who's Running Now?

AFTER reading the letter about "walls of wheat" [Jan.], I began to think the writer had something there. With that type of wallboard, a do-it-yourselfer would never have to worry about which way the grain was running.

G. D. MILNES, New Castle, Pa.

THIS is how you train at home to become a SERVICE ENGINEER in the Air Conditioning and Refrigeration industry...



An old industry offers bright new opportunities

Almost any industry has jobs for men with special skills. In many cases, good pay and steady work are the rule. Yet—would you be happy in being a repairman all your life? Wouldn't you rather have a job that presents a challenge—still bigger money—an opportunity to grow?

Listen, if you are ambitious to *keep climbing*: The air conditioning and refrigeration industry is growing so fast that 20,000 newly-trained technicians are needed each year. They can come only from the technical schools. Because installation and repair work is important, graduates may expect high pay and security right from the start. That's not all. A *well-trained technician has a great opportunity to develop into a Service Engineer*. As a matter of fact, 90 percent of all refrigeration engineers are former repairmen!

If you seek a *career*, not just a job, get into air conditioning and refrigeration. Your first step is to gain skill and knowledge. Learn at home by practicing with 25 big kits that CTI sends. Acquire experience as you train.

CTI ships you all parts and tools—with shop-proved instruction—to build a heavy-duty, commercial-type, $\frac{1}{4}$ h.p. condensing unit (illustrated above.) You complete 23 field-type projects—do 10 trouble-shooting jobs. You make home a training center!

So practical is CTI training that many students earn extra cash in spare time soon after they start. They make calls on their own, or get part-time jobs with local appliance dealers or air conditioning contractors.

But read the complete story. It is told in a new CTI catalog. Just fill out and mail coupon below for your copy. Sample lesson included. No cost nor obligation—Commercial Trades Institute, Chicago 26, Ill.

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Send catalog, Success in Air Conditioning & Refrigeration, and Lesson Sample. Both FREE.

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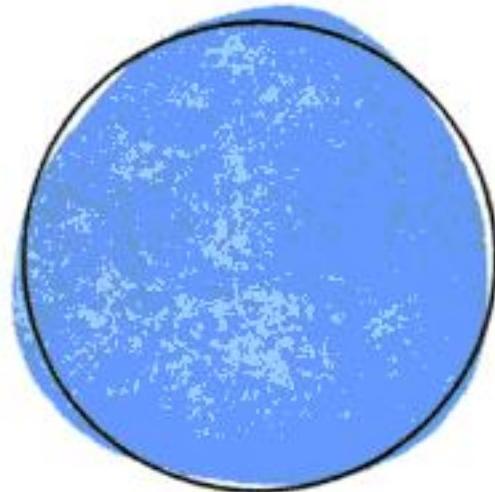
Address _____

City _____ Zone _____ State _____



The month in science

The earth is not round. Not like a ball, anyway. It's pear-shaped. That's what space scientists found from precise tracking of satellite 1958 Beta-2 (the Vanguard ball launched a year ago).



As it circled the earth, Beta-2 came a little closer near the north pole than near the south pole. That didn't figure. If the earth were a slightly squashed figure, as the experts thought, the satellite's closest approaches should have been the same, north and south. The orbit, as it was measured, fits an earth with an elongated northern hemisphere and a bulging southern hemisphere—something like a pear with the north pole for the tip.

The difference isn't much—the north pole sticks up 50 feet higher than "normal," and the south pole is 50 feet lower—yet it sets off a chain reaction of changes in long-cherished ideas. For instance, this rearrangement of weight on the outside of the earth increases by 10 times the shearing load that the interior of the earth must sustain. And that means the interior itself must be stronger—stiffer and less plastic—than anybody had guessed.

Shangri-La under the sea. There's a 5,000-mile stretch of the Pacific Ocean from Panama to Mexico's Lower California peninsula where the fish grow bigger than a fisherman's lie. Marlin weighing 2,500 pounds have been caught there, 10 times the size of the marlin usual farther north, off San Diego. Yellowtails run to 100 pounds, compared to 20 pounds for the same variety off San Diego. Plants, too, grow bigger and healthier. Kelp seaweed



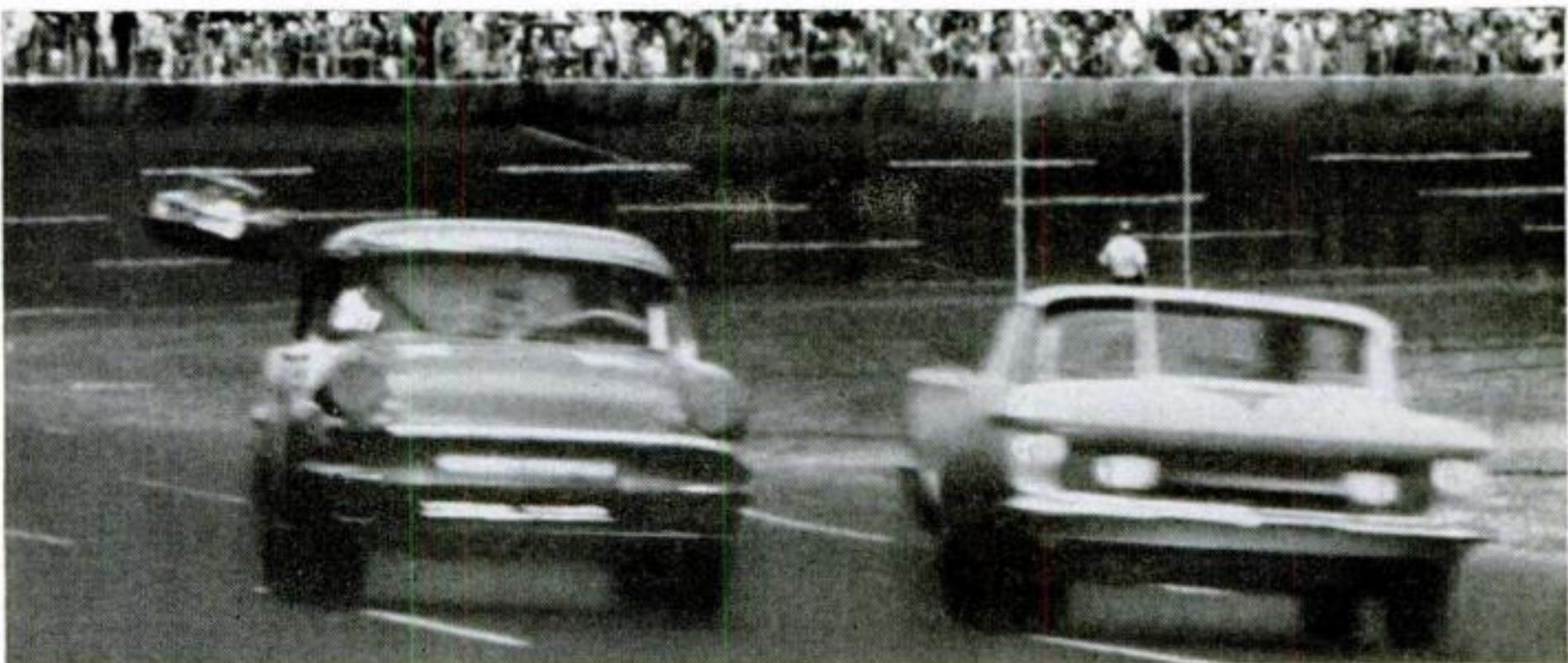
plants develop bases three or four feet in diameter and heights of 100 feet or more.

Something in the water? Could it make humans as robust? This spring scientists from a number of West Coast research institutions working together set sail to find out.

Do-it-yourself census. When nose-counting time comes around again next year, the Government expects you to help count yourself. The Census Bureau will mail you the questionnaire to be filled out. A couple of days later the census taker will call in person to collect it (and fill in anything you left blank).

Main reason for the new system is accuracy. Previously, all data came from personal interviews. This meant that most often the census taker talked only to the woman of the house, at a time when she was busy and could not check personal records or ask other members of the household for precise information.

The Bureau double-checked after the 1950 census. Specially trained interviewers went back to some areas and asked the same



Firestone safety research in action at Daytona International Speedway

Firestone breaks world stock car record at Daytona Speedway...



Firestone speedway research pays off in safer highway tires

proving Firestones safest and longest-wearing at turnpike speeds!

Firestone is FIRST in competitive tests that prove performance for you!

In February's record-shattering races at Daytona's new International Speedway, high-contour curves took the lid off the speed limit. Winning drivers rode Firestone tires to new world records for every racing distance! And only Firestones were good enough to finish on the top nine cars in the NASCAR† 500-Mile Sweepstakes where the winner's average speed was 135.52 m.p.h. Most important of all—Firestones, and only Firestones, completed every blistering Daytona test without a single blowout. That's important news to remember the next time you buy tires. Get the test-winning performance of Firestone Rubber-X,* the longest-wearing rubber ever used in Firestone tires. Order them on your new car, or buy now, on convenient terms if you wish, at your nearby Firestone Dealer or Store.

*Firestone Rubber-X is compounded specifically for each type of car, truck, farm implement and construction equipment tire. †National Association for Stock Cars.



Lee Petty, NASCAR 500-Mile Sweepstakes winner at Daytona, Fla., says, "When it comes to the big test, only Firestones are good enough."

Firestone

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The month in science

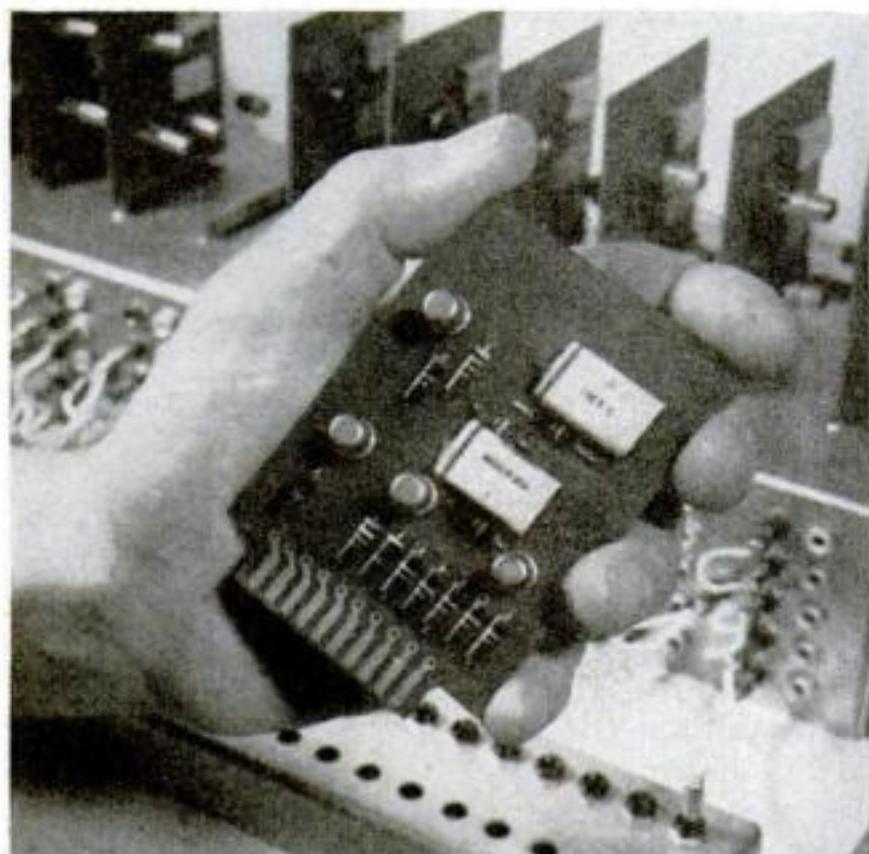
questions over again. Often, the answers were quite different. Age and income are among the figures that statisticians have long eyed critically. For instance, some areas come up with more people 65 to 69 years old than 60 to 64, which looks fishy. (One possible explanation: Under 65 there's no incentive to admit advanced years; over 65 there is—social-security payments.)

People generally knock 10 percent off their income when talking to the census taker. There are lots of reasons. Some suspect the Government man's motives (needlessly); some overlook incidental money such as interest and dividends; others forget that actual income is considerably greater than the amount on the paycheck (because of deductions for taxes, insurance, union dues and whatever).

The new questionnaire system, designed to reduce these unintentional errors of forgetfulness, was tested last winter in two counties in North Carolina.

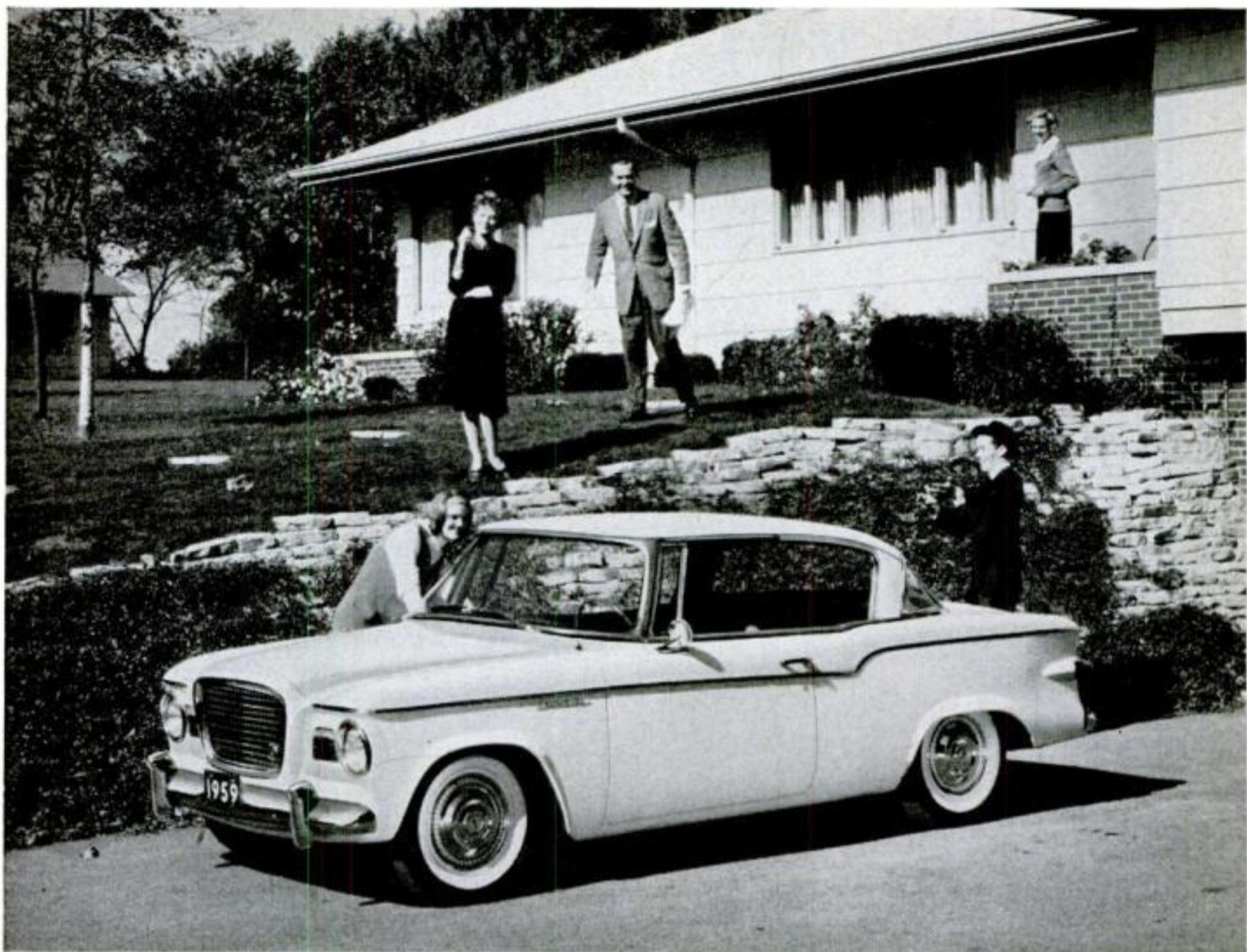
Electronic nerves. Hook up four transistors, a couple of condensers and a dozen or so resistors on a printed-circuit board and you have an imitation nerve cell. Like the genuine article (which does operate electrically), the electronic cell gives out pulses of electricity when stimulated the right way, refuses to respond when stimulated the wrong way, and slows down when tired by prolonged "firing."

Researchers at Bell Labs connect groups of electric nerve cells in different ways to make crude working models of parts of the human eye (with a photoelectric cell) and ear (with a microphone). They have already duplicated the eye's "on receptors," which pulse as light increases, "off receptors," which pulse as light decreases, and "during receptors," which pulse when light is steady. They have even imitated persistence of vision with cells that signal



"steady light" when the light is actually flashing rapidly, just as your own eyes fool you into thinking the separate flashes of movie or TV pictures are continuous images.

Nobody out here but us Russians. Men will be orbiting in space this summer—or sooner. They won't be Americans. So says Dr. Fred Singer of the University of Maryland. Dr. Singer suggests that the Russians got ahead of us by mistake: They planned their military missiles in the day of the heavy A-bomb, and ended up with rockets that are really too big for H-bombs—but just right for hurling remarkable payloads out into space.



RALLY ROUND THE LARK, MEN (and girls, too)

THE *LARK* BY STUDEBAKER

Here's the car that's fun to drive. It's The Lark by Studebaker! What makes The Lark so much fun? It combines the most desirable qualities of handling and maneuverability of Continental machines with the spacious 6-passenger interior typical of much larger U.S.A. automobiles. In brief, The Lark provides you with satisfaction at the wheel. Down under a short 108 inch wheelbase, variable rate coil springs surround front hydraulic shock absorbers; asymmetrically mounted semi-elliptical springs combine with outward-angled rear shocks. The result, teamed with a 175 inch overall length, provides good cornering and a smooth, but firm, ride. It cuts acceleration "squat," too! Ideal for gasoline stretchers, the 170 cu. in. "6," with improved induction and manifolding, is great for winning top money economy awards. For higher performance, the 259 cu. in. V-8 with 4 barrel carburetor and dual exhausts is ideal. It *really moves!*

Why don't you "move" to your local Studebaker dealer today and test drive The Lark? It's your new dimension in motoring.

Have you heard...?

Where's Where? Somebody's thought of an ingenious—and basically simple—system for locating any spot in the world. Instead of pinpointing addresses by towns, states and nations (remember the letters you wrote as a kid that ended with "western hemisphere, earth, solar system, universe"?), you revert to sheer geography: You fix the location of your house and lot by reference to its latitude and longitude.

Normally that wouldn't be easy, but Ambrose Ryder outlines a system in his book *Where Is Where* that does it in two series of numbers. A typical address would look like that on the envelope in the illustration.

The first set of numbers refers to distance east of the International Date Line; the second to distance north of the South Pole. The digits show refinements of latitude and longitude measurements.



Mr. John Smith
57-6652E
78-5538N

The smallest unit of measurement is called a centamin. One centamin is $1/100$ of a minute ($1/60$ of a degree). Since distances between degrees are never more than 70

miles, a centamin would amount to something less than 60 feet. The surface of the earth could be blocked out in areas smaller than many city lots.

The resultant simplification would speed mail deliveries (it could be electronically sorted) and aid police and fire departments. But could people be persuaded to adopt it?

Another gas hike? Increased labor costs and higher octane ratings spur talk of a gas price rise. By the time it gets passed down to the local station, it might get pumped up to a penny and a half a gallon. This in spite of the fact that there are healthy gas stocks available. One refiner argues that it'll cost more than half-a-cent a gallon to increase his company's regular gas octane rate from 89 to 90.5. He blames it on Detroit's higher and higher compression engines.

Will your federal income tax return be audited? Here are the odds:

- Excellent—in the case of a really big income.
- Very good—if tips or expense-account deductions figure large.
- Good—if a sizable refund (over \$200) is asked.
- One to four—if your income is \$10,000 or less.

Tax men will fully audit $2\frac{1}{2}$ million out of the 60 million returns, paying particular attention to the 15 million that are not machine-

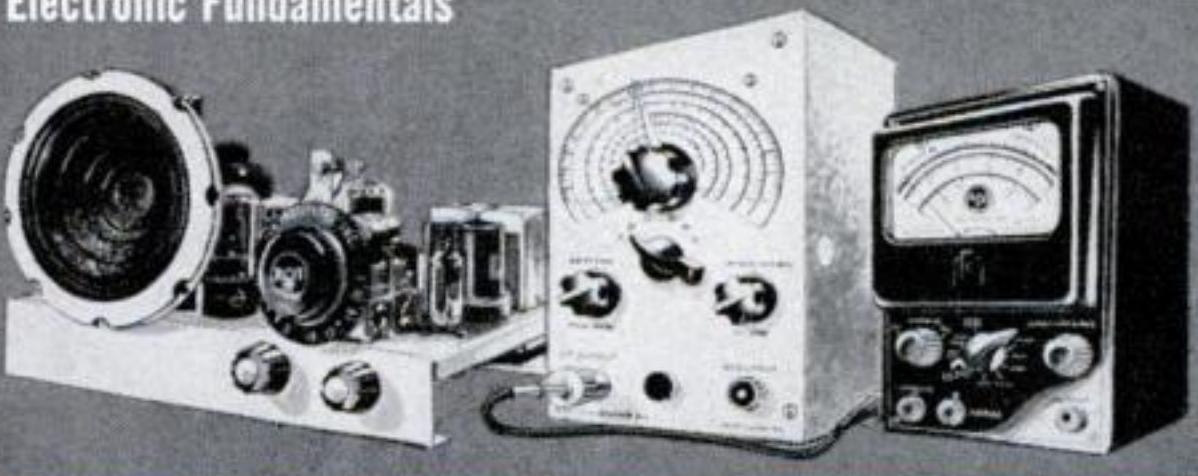


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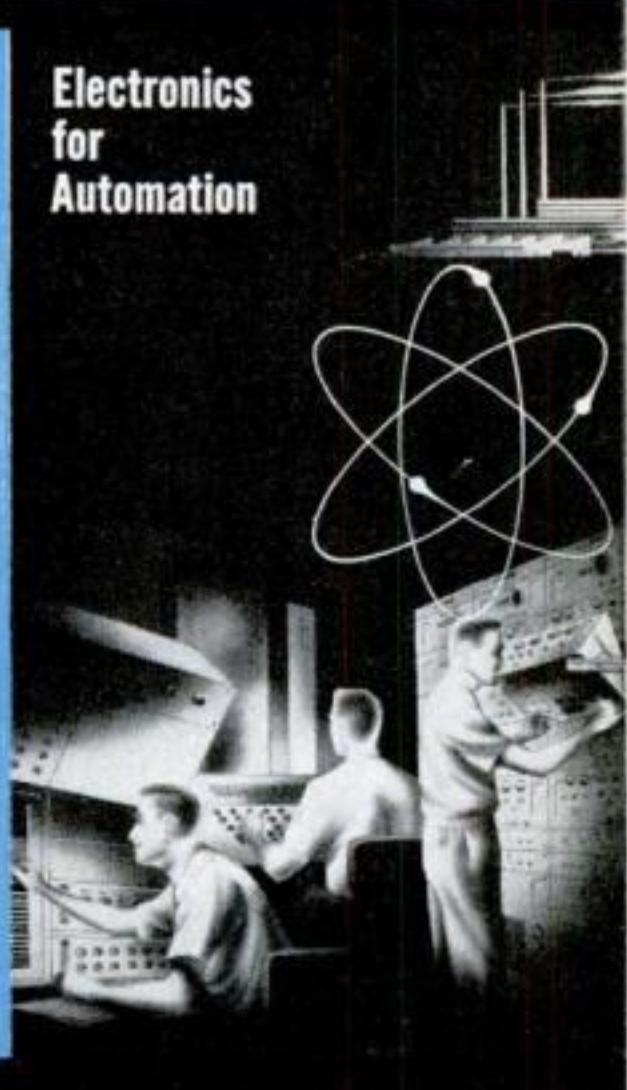
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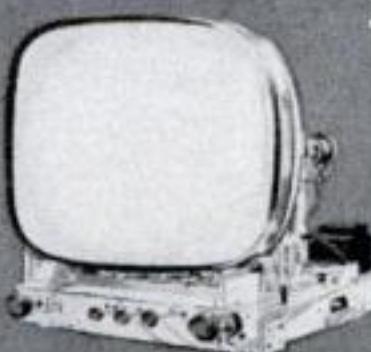
Electronic Fundamentals



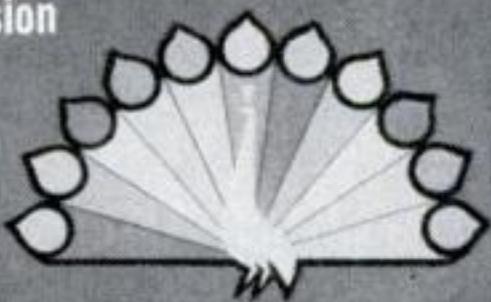
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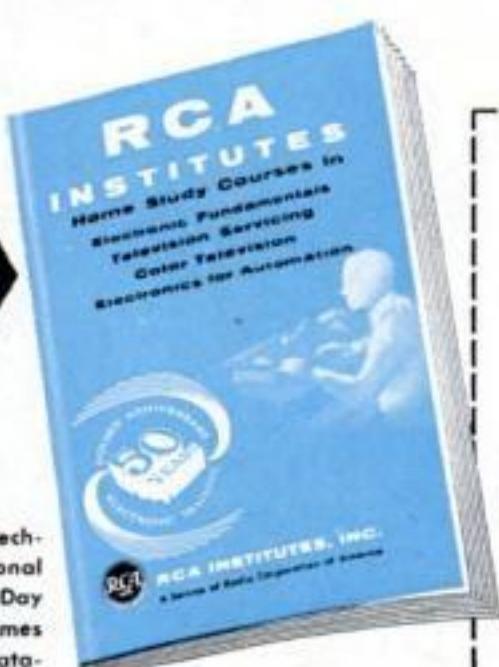
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Have you heard...?

handled card forms. With heavier use of machines this year they'll have more time for the others. Officials predict the closer scrutiny will pay off in extra revenues.

Germs are getting better all the time. No, not the deadly ones, but vast numbers of "good" bacteria. Everyone knows their traditional good offices in making vinegar, fertilizing soil, putting the holes in Swiss cheese... What's new are applications of existent strains, and some new ones, in such unlikely areas as oil prospecting, waste disposal, space travel!



A bacterium is a one-celled bit of protoplasm within an almost invisible membrane, commonly rod-, spiral-, or sphere-shaped.

A few come comma- or T-shaped. Two hundred thousand could easily fit into the dot of this i... Over 150 different strains are currently being exploited commercially:

- In chemical-waste disposal. Injecting billions of certain bacteria into caustic carbolic-acid waste renders it harmless by inducing a neutralizing chemical action.
- To clean drains. Housewives can buy a commercial solvent whose principal ingredient is a type of bacteria that literally chews up grease and sediment.
- In mining and milling metal ores. Bacteria work chemical changes in a copper leaching solution to produce acids that pick up minute particles of the metal. These are then deposited on scrap iron for recovery. Same process may be applied to low-grade deposits of zinc, manganese, iron.
- In oil prospecting. Some microbes thrive on hydrocarbon gases seeping up—often in quantities too small to be chemically analyzable—from underground oil pools. Chemists gather likely soil samples, add more hydrocarbon gas to them. If the gas-eating microbes are present, they'll multiply and show up under the microscope.

Potential uses for existent strains under study will be:

- To produce new chemicals by breaking down coal with bacteria.
- As a food additive for cattle.
- For space travel. Bacteria could convert human waste and nitrogen from the air into food for simple plant life like algae.

These in turn could manufacture oxygen as well as serve as a possible food source for space travelers (the ideal "closed system").

Some microbiologists play with the genetic structure of germs, inducing mutations—basic changes in bacterial offspring. In a kind of "survival of the fittest" regimen they're producing races of super-germs which could be used to:

- Leach very low-grade ore.
- Live on formaldehyde—another common industrial waste.
- Speed the flow of oil once found—by burning holes in the oil formation, creating detergents to thin it, producing carbon dioxide to increase gas pressure.
- Develop a zest for sulfates—thereby solving the growing problem of detergents foaming up city sewers.
- Crave noxious atmospheric gases—a smog solution.

This Powerful Feridium* Anode is built into every



LEE

Resin-weld* OIL FILTER

THAT'S WHAT MAKES IT THE ONLY FILTER IN THE WORLD THAT COMPLETELY REMOVES BOTH ENGINE SLUDGE AND ACIDS — STOPS THE TWO MAJOR CAUSES OF ENGINE WEAR!!

Discover for yourself the amazing action of this entirely new kind of oil filter cartridge — an oil refinery in miniature right under the hood of your car! Discover how its **DUAL ACTION** not only traps injurious, micron-size particles (abrasive sludge) too tiny for the eye to see — **IT ALSO NEUTRALIZES AND REMOVES ENGINE-EATING ACIDS!**

The patented Resin-weld* one-piece construction insures Positive Filtration from oil change to oil change. The resin-impregnated, heat-treated and cured accordion element in the plated metal shell (no paint to contaminate the oil) — the thousands of pre-determined openings — all provide unrestricted oil flow.

If you demand top engine performance and value your engine life, insist on a LEE Feridium* Anode OIL FILTER. It's two filters in one — it gives you twice as much engine protection at no extra cost!!

THIS COMPARATIVE PERFORMANCE★
CHART OF THE 4 MOST-POPULAR
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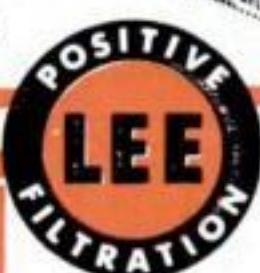
	LEE Feridium* Anode FILTER	OIL FILTER "A"	OIL FILTER "B"	OIL FILTER "C"
RATE OF FILTRATION	5 Min.	8 Min.	9 Min.	5 Min.
ACID-DESTROYING PROPERTIES	COMPLETE	No effect	No effect	No effect

★ From independent tests by The Carlson Laboratory.

LEE Feridium* Anode FILTERS conform to functional standards set by the Society of Automotive Engineers, U.S. Army Procurement, Fort Belvoir Research and Development and initial equipment specifications of car manufacturers. Sold all over the world at Service Stations, Garages, Accessory Stores and Car Dealers. Also available for most imported cars.

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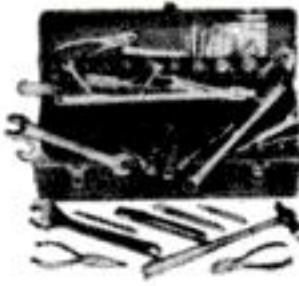
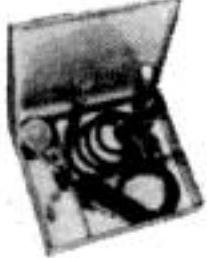
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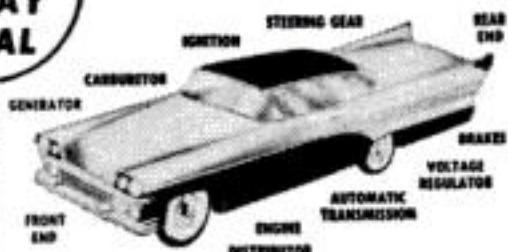
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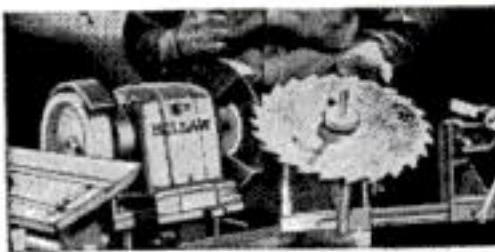
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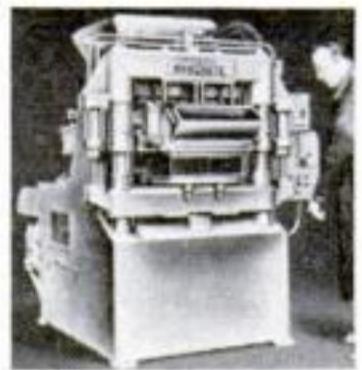
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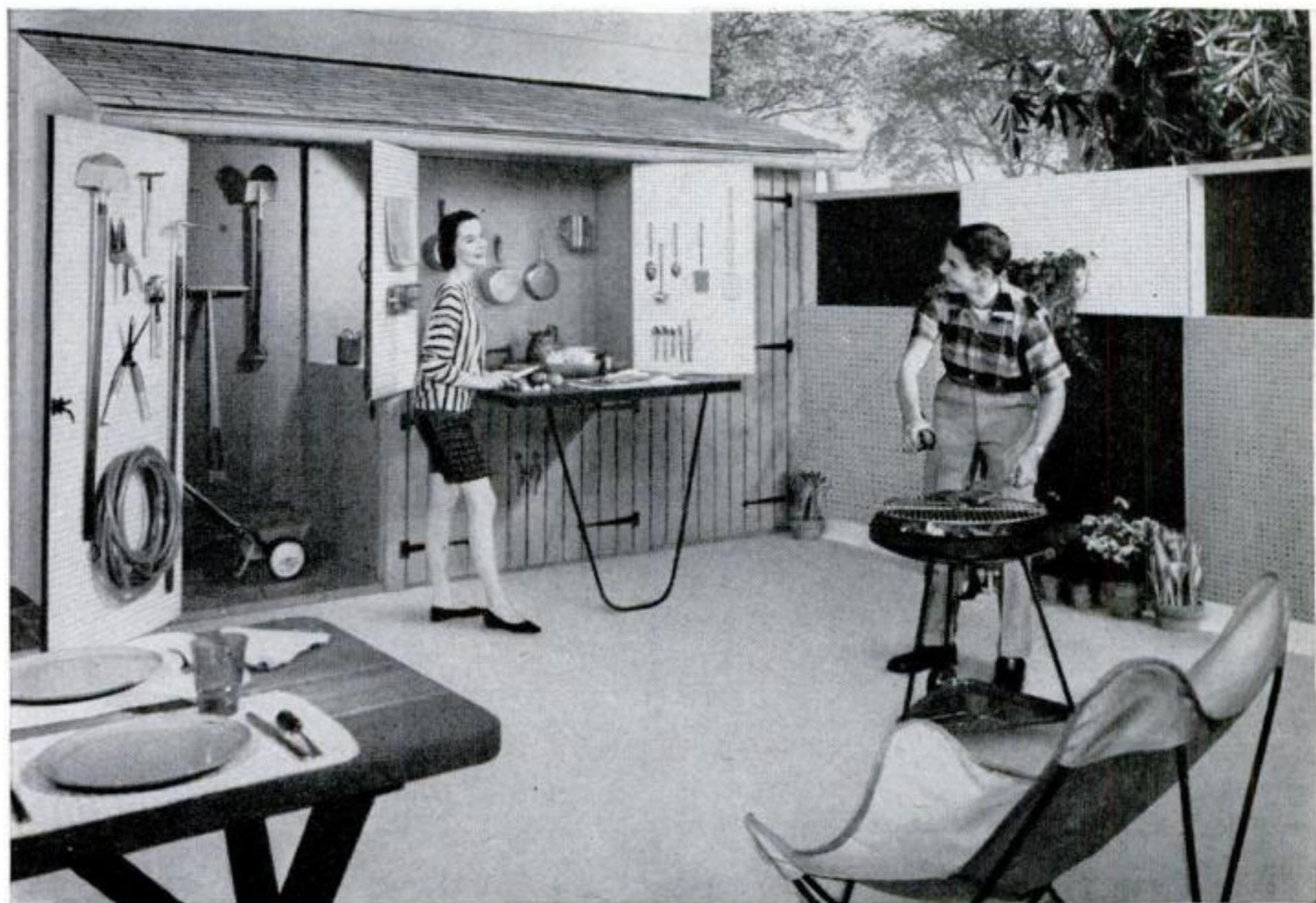
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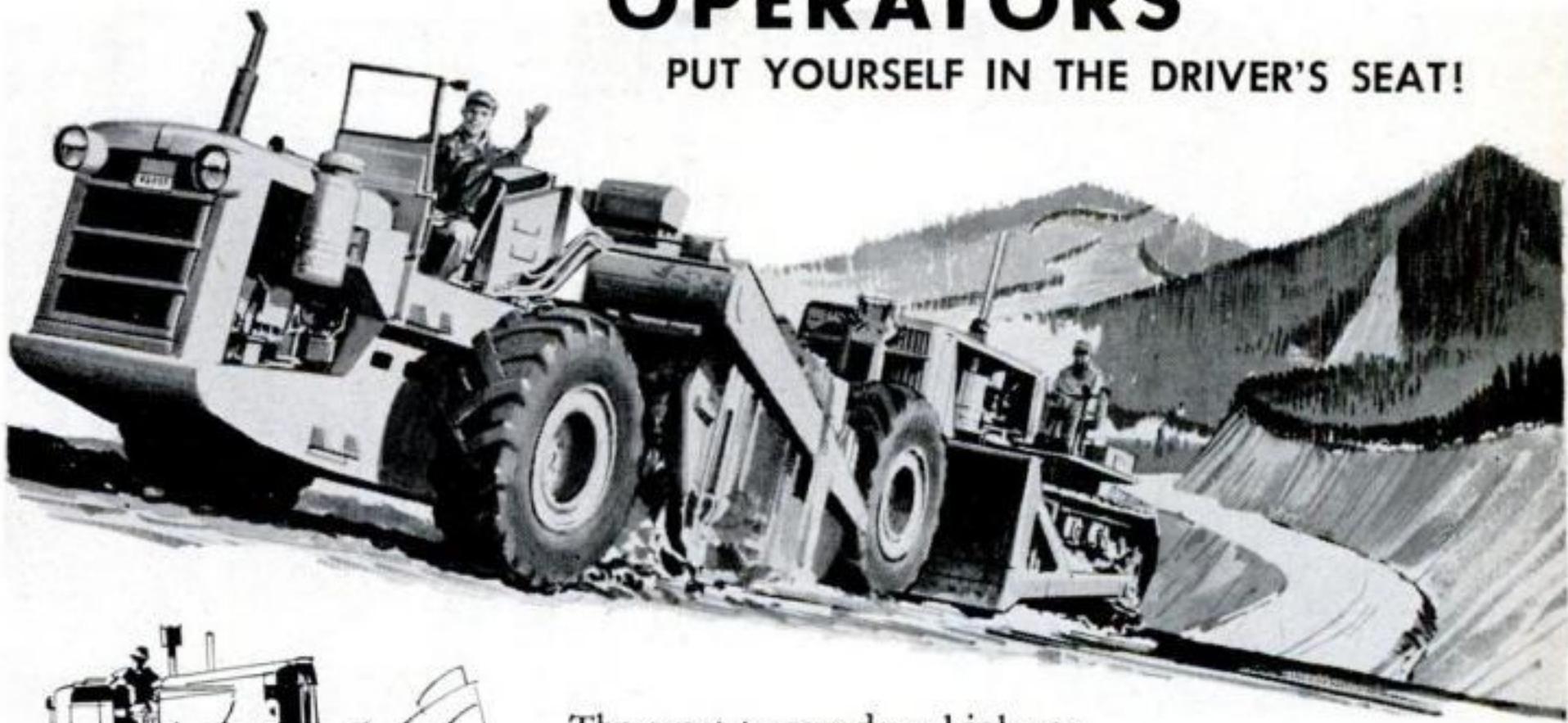
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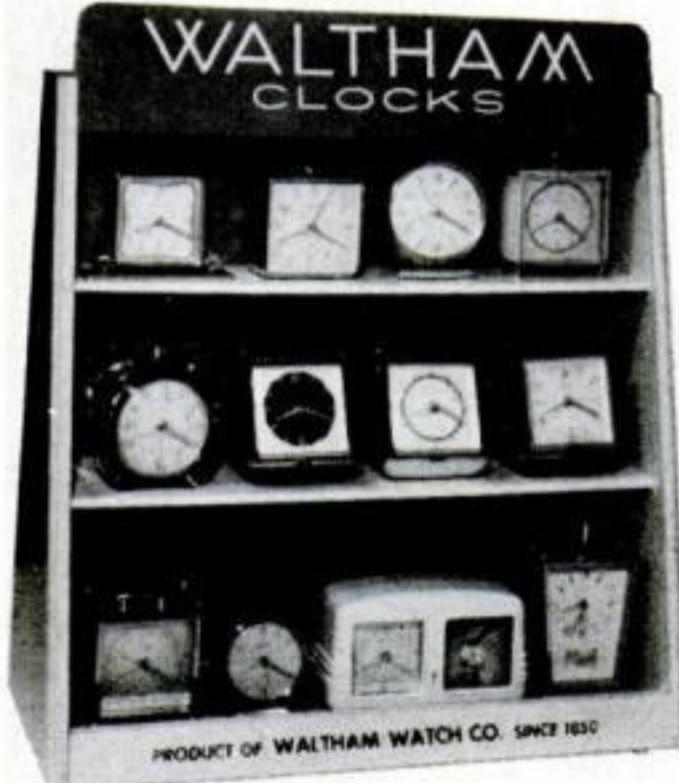
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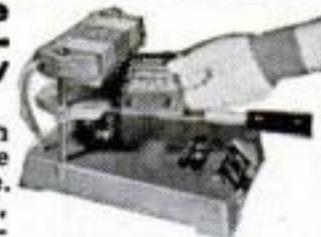
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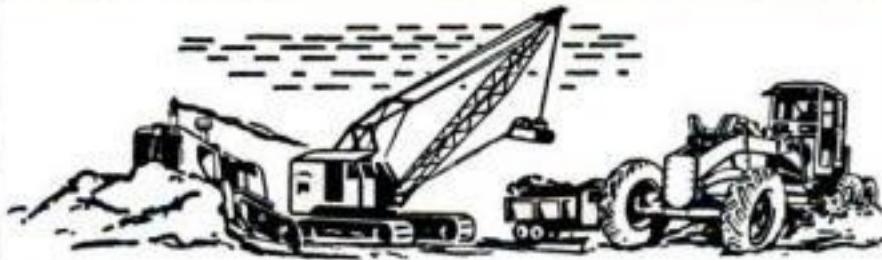
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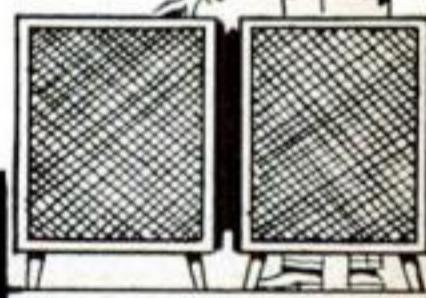
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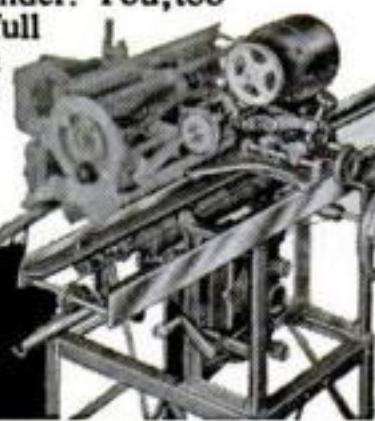
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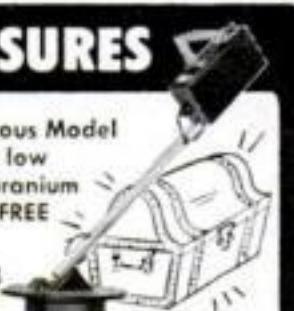


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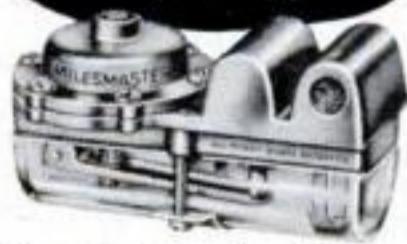
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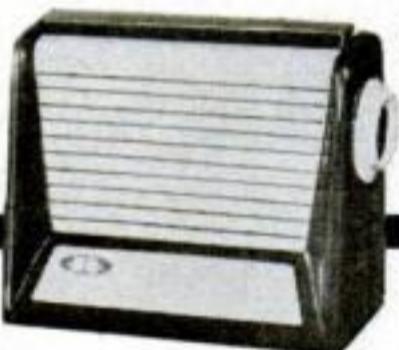
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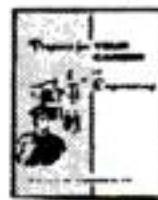
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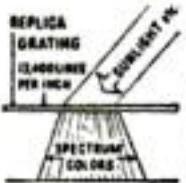
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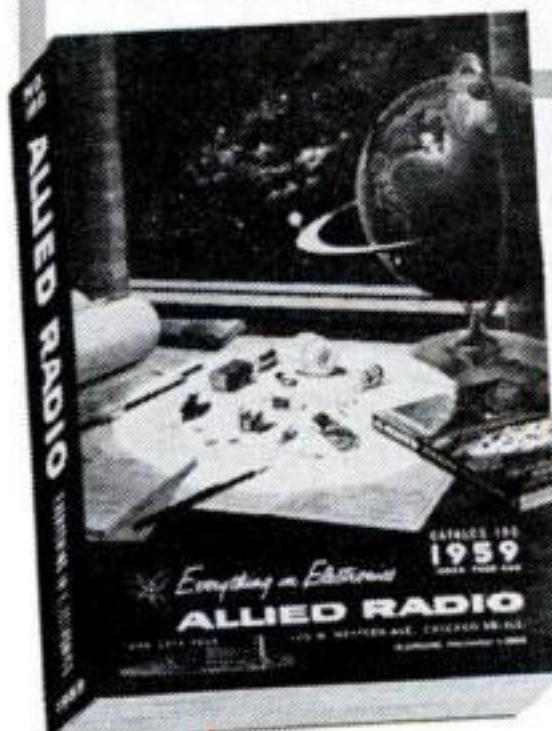
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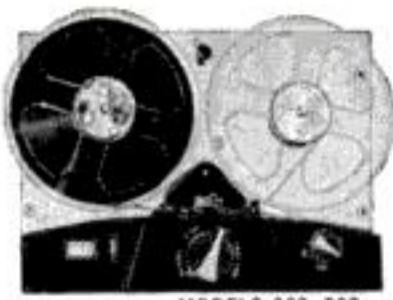
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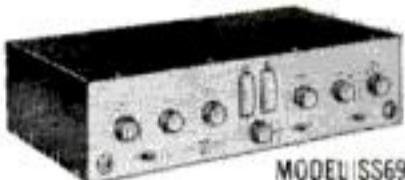
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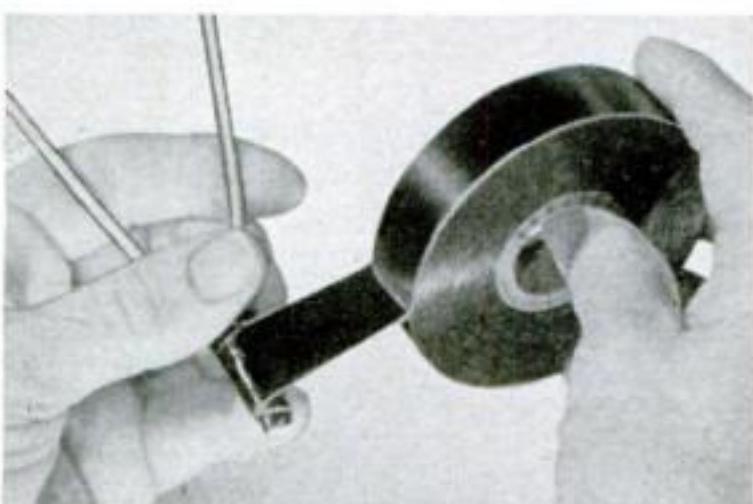
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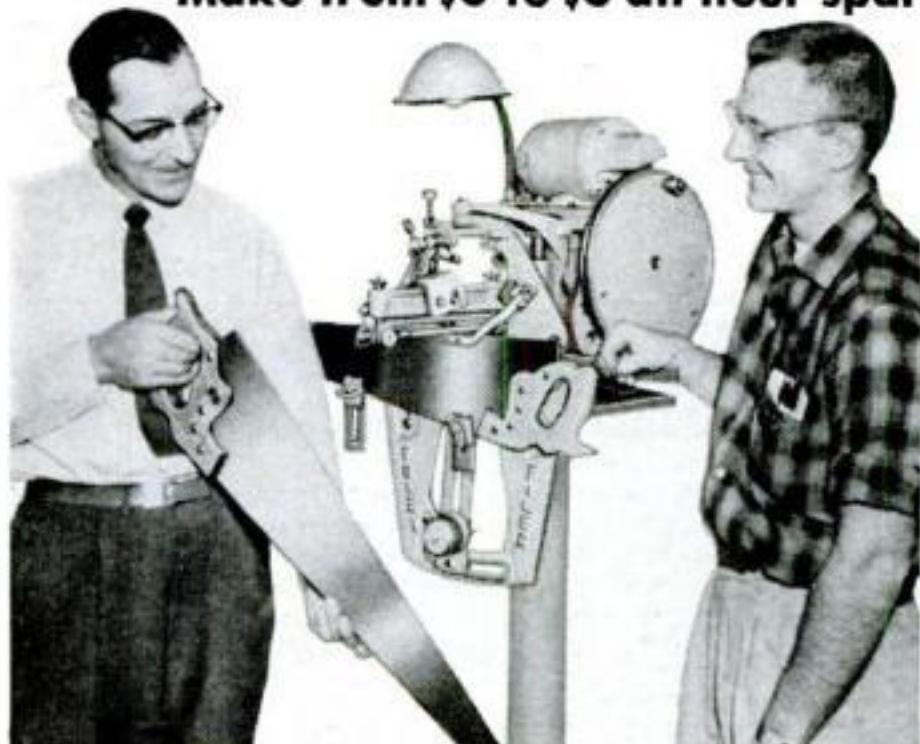
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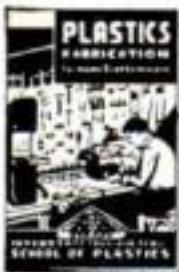
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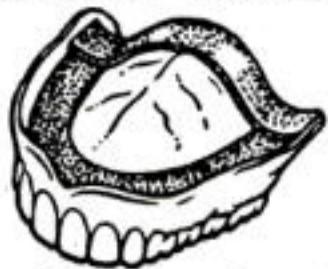
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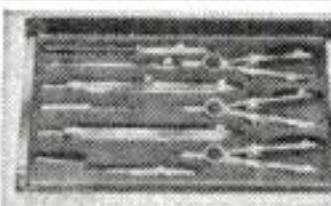
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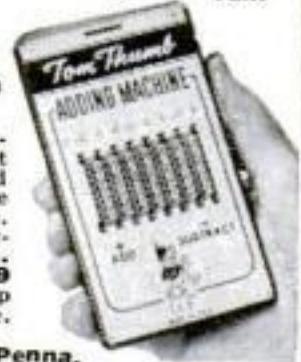
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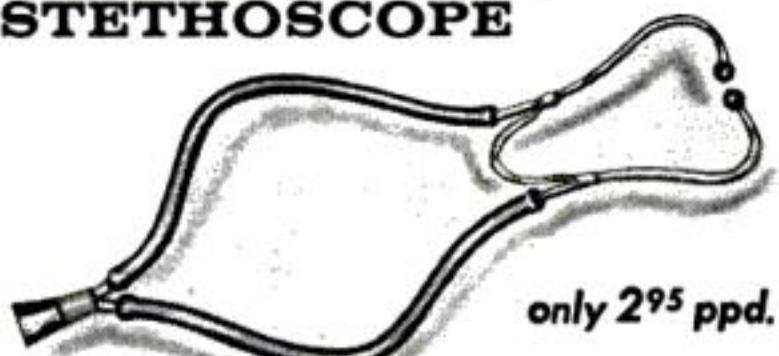
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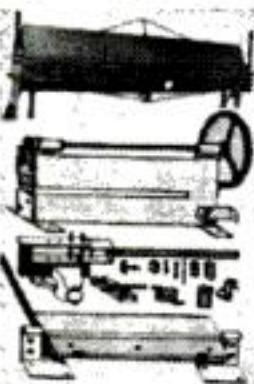
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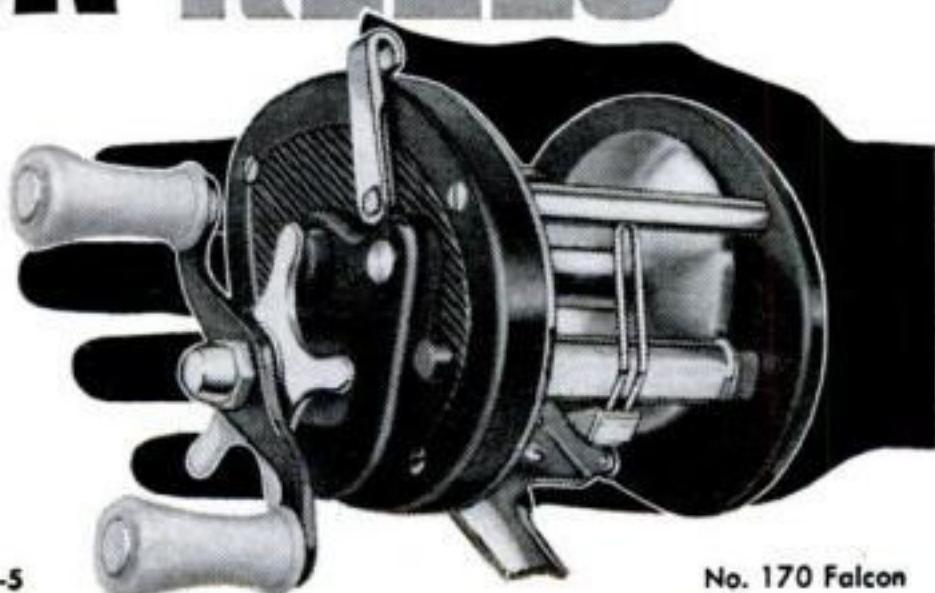
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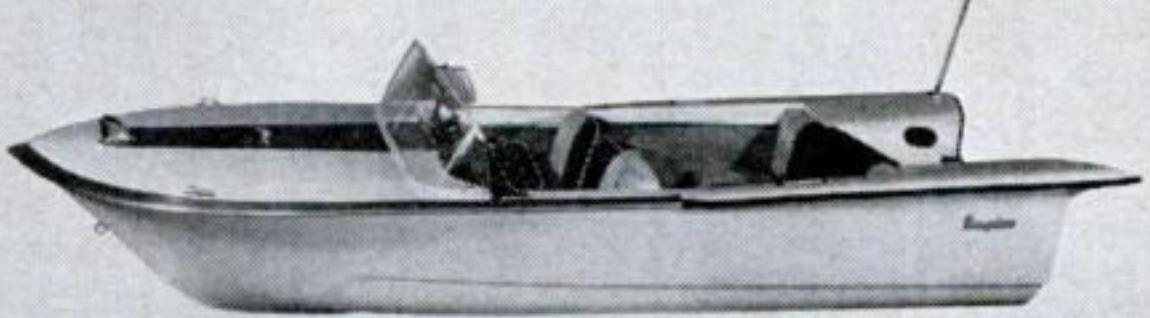
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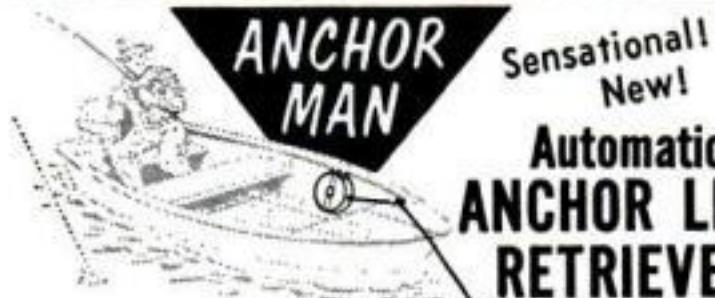
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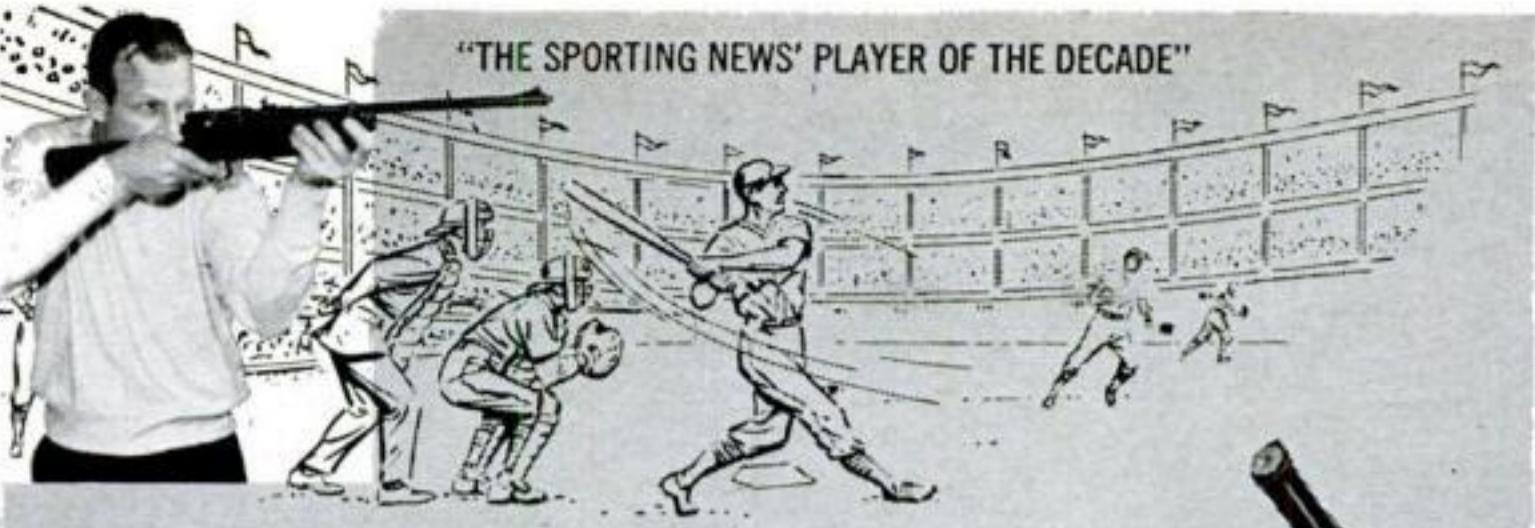


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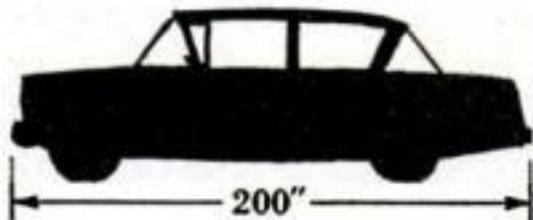
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Question: When is a small car not really a small car? Answer: When built by the Big Three. It is true that GM, Ford and Chrysler are preparing to build smaller automobiles—but to call them “small cars” is misleading. Nor is it accurate to label them “economy cars”—except, again, by comparison with current Detroit models.

Truth is that the vehicles being prepared for debut later this year are what American Motors’ George Romney has tagged “compact cars.” Smallest will have a wheelbase of 106 inches; others may run to 113.

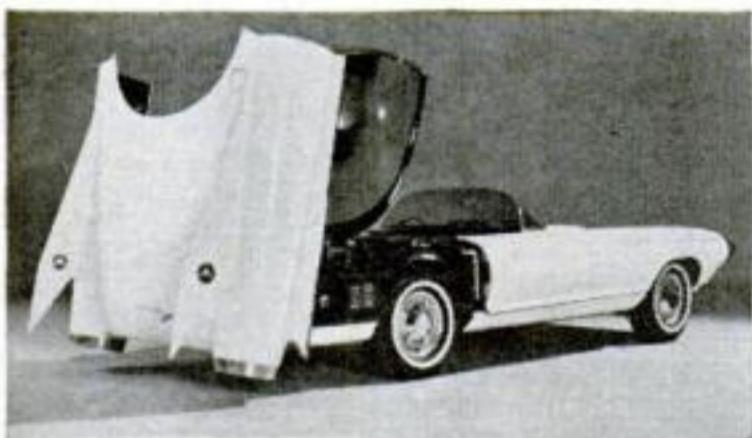
Overall length will be at least 180 to 185 inches. Some may stretch past 200 inches—which means they won’t be much different from Fords, Chevrolets and Plymouths of the

late forties. Cost of the new creations, as well as size, will be substantially larger than best-selling imported small cars like VW and Renault. Vague references to “about \$2,000” are heard but delivered prices will almost surely top that.

These are among the reasons that dealers handling overseas makes are not particularly scared by Big Three plans. They figure there will continue to be a market for their smaller, more economical offerings.

This is backed up by surveys which show that few imports are being traded in for the two currently available U.S. compact cars, Rambler and Lark. Dealers for these makes report most of their “conquest” sales are being made to former Ford, Chevy and Plymouth owners.

Besides size and cost, imported-car dealers are banking on established reputations for product quality, built-in appeal of the word “imported,” and the fact that they can offer something different.



Cadillac's new dream car, the “seeing eye” Cyclone, was tricked out with a radar scanner that gives audible and visual warning of approaching cars or other objects.

Other gee-whiz features include a transparent retractable roof that rises automatically when the doors—which spring out and slide back at touch of a switch—are opened.

(Unlike seeing-eye dogs, however, the Cyclone does not wag its fin-topped tail when its owner approaches.)

Less dramatic than radar and retractable roofs, but more significant, is the use of inboard rear brakes, transaxle rear-mounted automatic transmission, and cast-aluminum wheels—definite production possibilities in the foreseeable future.

The quality-improvement campaign, widely publicized by Detroit last fall, has had effect, according to some dealers. One reports that time

necessary for predelivery make-ready work has been cut from $1\frac{1}{2}$ or two days to a few hours.

At least no Big Three representa-

[Continued on page 256]



you're in for a "REVELATION" *be our guest...fun test an Evinrude!*



Isn't it time you tried it? One trial ride with a Golden Jubilee Evinrude will show you something new about power . . . performance . . . and value! It's REVELATION RIDE time at your Evinrude dealer's now. Make a date for your ride now. Look for his name under "Outboard Motors" in your phone book. Catalog free—write: Evinrude Motors, 4179 N. 27th Street, Milwaukee 16, Wisconsin.

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Compare features against any and all comers! Compare performance to anything comparable in power or price!

The plain truth is, you're missing a rewarding experience until you try a "Revelation Ride!" Your Evinrude dealer invites you to make a date for *your* ride now!



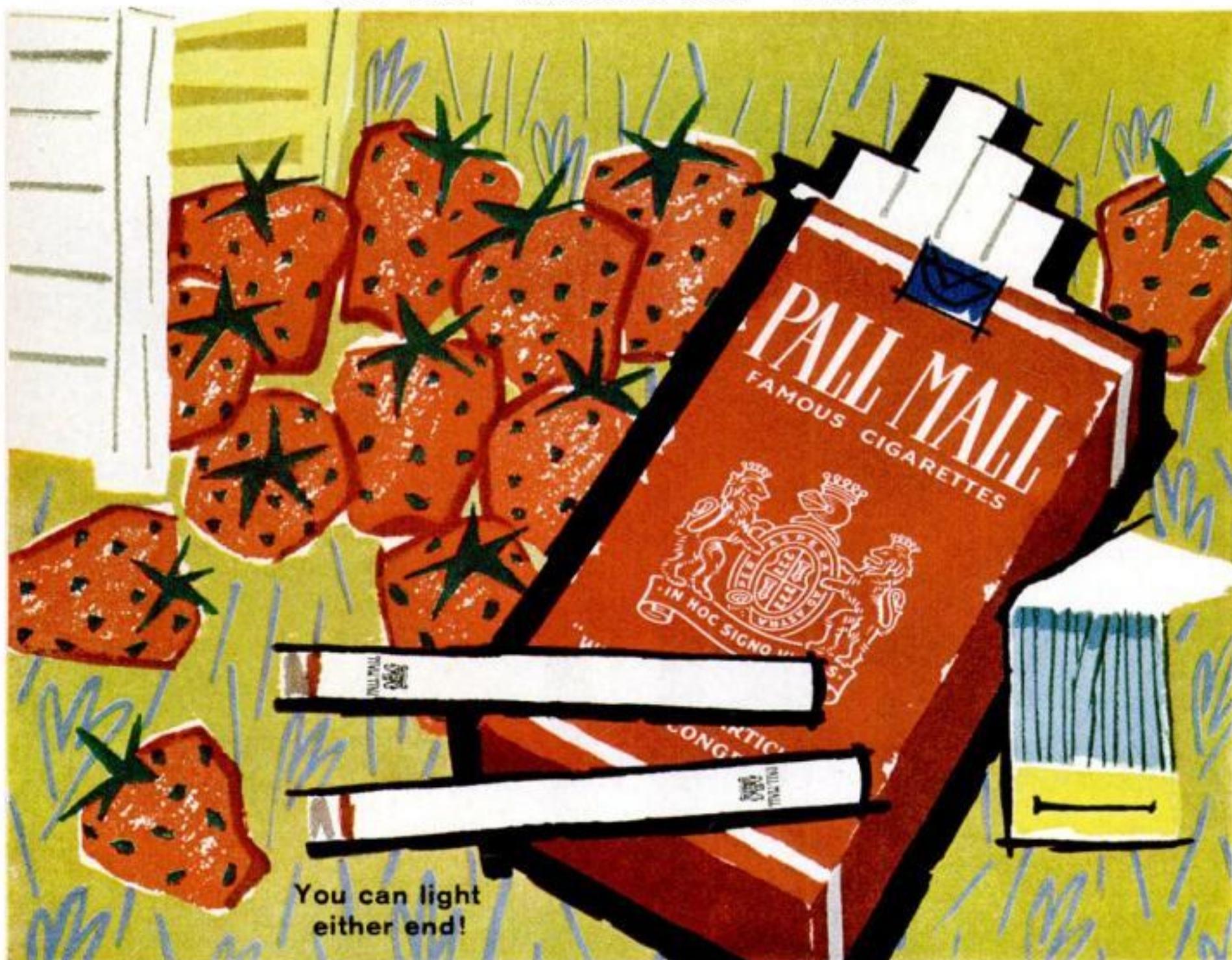
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Why You Can't Fool the Radar Cops

PHOTOS BY W. W. MORRIS

Will strips of foil make your car invisible to radar? Some people think so—until they get tagged

**By Ralph W. Sanders
and Martin Mann**

WHEN a traffic cop motioned a salesman in a blue sedan to the side of the road, the young man was unperturbed until the cop began scribbling in his ticket book.

"What's the matter, Officer?"

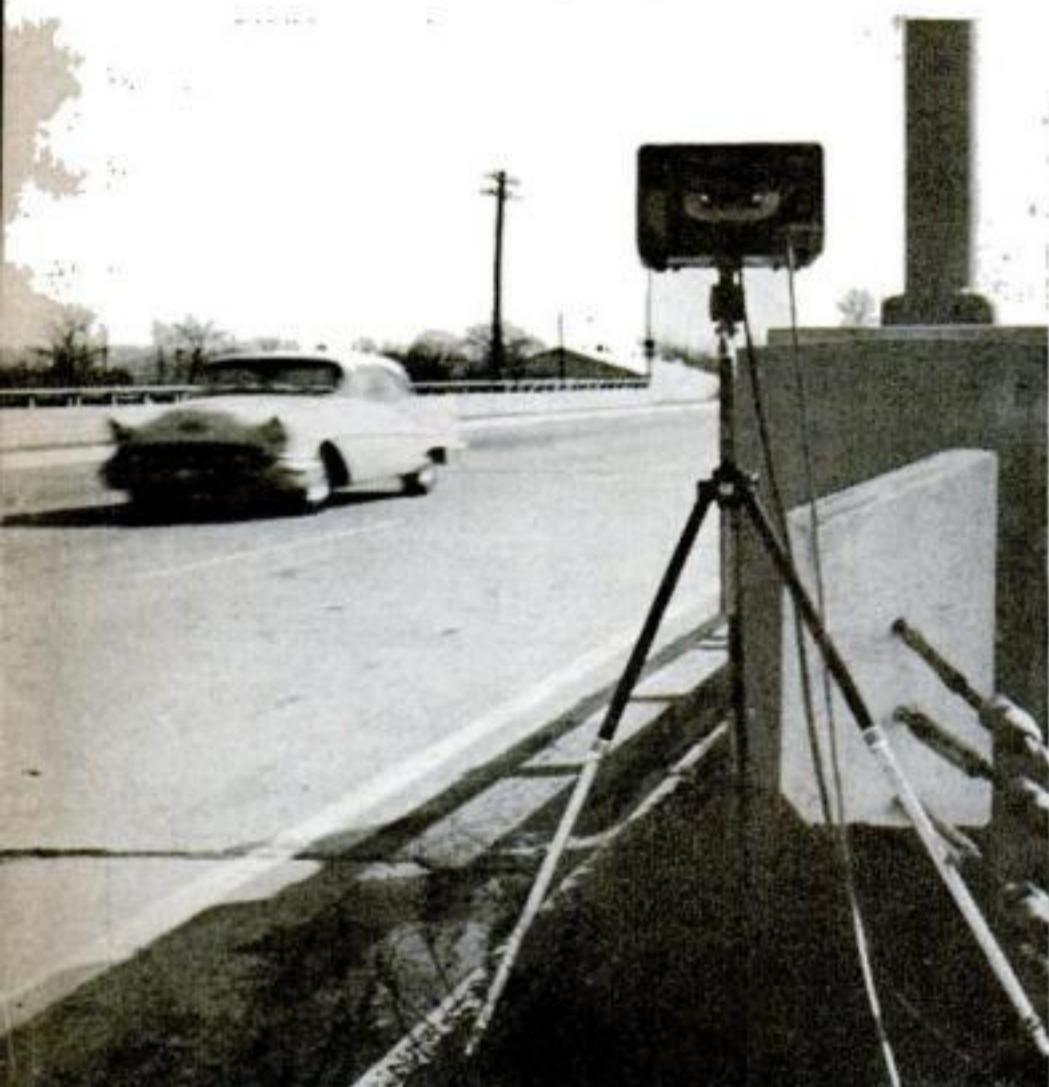
"I'm giving you a ticket for doing 37

BEAMED UP
HIGHWAY

RADAR TO WAGON

WATCHES METER, TRAFFIC

How radar cops put the beam on speeders



1 **TRIPOD-MOUNTED BOX**, not *really* hidden, checks every car in northbound lanes of Highway 17 near Mahwah, N.J. It gauges speed by change in length of radar wave that car reflects.



2 **EQUIPMENT WAGON**, about 50 feet from the green box (and not *really* hidden, either), contains a meter that indicates speed and a recorder that makes chart (for court evidence).

miles an hour in a 25-mile zone. You were clocked by radar three blocks back."

"Radar! But I put tinfoil in the hubcaps. Radar can't clock my car!" Then he looked at the ticket in his hand. "At least I didn't think it could."

That salesman was another victim of a growing delusion: that you can beat the cops' radar by making your car invisible to it, jamming it, or otherwise fooling it. A lot of folklore is spreading around the country about secret ways to stymie this electronic speed trap. But the facts are these: The only known ways to do it are wildly impractical and costly.

More and more people keep trying. One reason is the sudden sprouting of the uncanny green boxes at roadsides all over the country. They were introduced only 12 years ago. Now the cops have 2,000 monitoring traffic.

Another incentive to radar jamming is

the get-tough-with-speeders policy. In a couple of states, a single conviction takes away your license, a fate that some motorists consider second only to the electric chair.

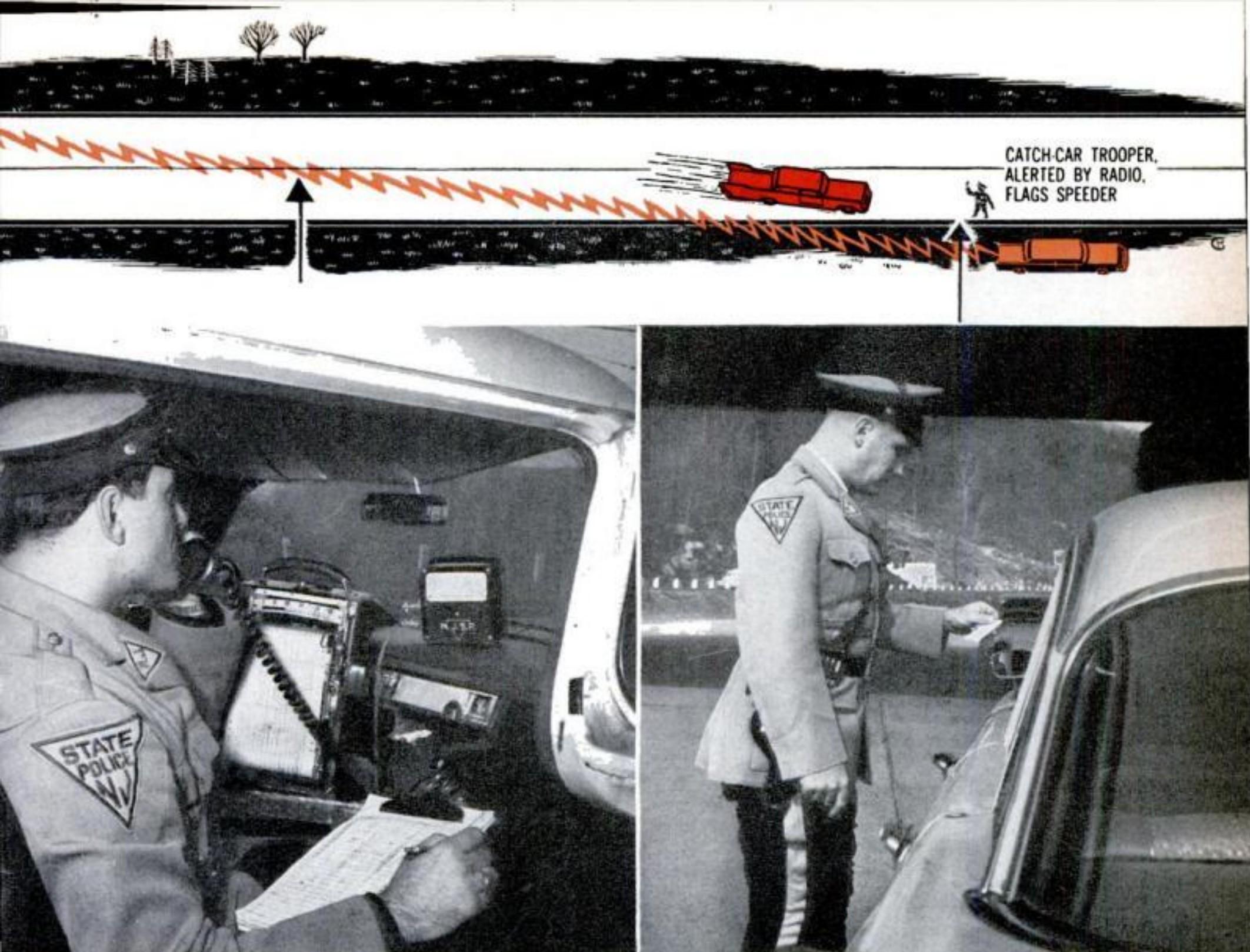
Yet the most anybody ever gets for ingenious attempts to outwit electronics is a summons—even though the ingenuity is remarkable:

In Utah, a few drivers put loose bearing balls in their hubcaps. This did help the cops hear them coming. (Noise is a popular anti-radar charm—some motorists sound their horns or blow whistles when in the beam. It doesn't work.)

In Springfield, Mo., Police Sgt. Charles D. Walker reports that taxi drivers coat their fan blades with aluminum paint. It doesn't work.

In Texas, a man put luminous paint over the chrome on his car.

In Kansas City, an atomic-age driver



3 "HERE YA GO," radios Trooper Ray Massaro from equipment wagon. "Take this green Olds . . . victor nan ten x-ray." Later Massaro radios partner the speed: "Six two, six two."

packed his hubcaps with uranium ore. In Memphis, the rage was for static ground straps, the kind gas trucks use. (Remarkable a Memphis cop, "Hah, we checked the radar on a freight train the other day, and it counted every car. And trains are perfectly grounded on steel rails.")

Most potent—supposedly—of the amulets for warding off radar is tinfoil (actually the kitchen variety of aluminum foil). Miles of it have been draped over bumpers, hung from axles, twisted around radio antennas or wadded inside hubcaps. It doesn't make any difference how you use it or where, because it doesn't work.

Why not? The radar myths, like most folklore, grew from seeds of fact.

The belief in noise as a radar protector may stem from the cops' use of tuning forks to test the equipment. It's not the

4 "YOU WERE CLOCKED AT 62 BY RADAR," says "catch-car" trooper Peter Kusant (Jersey limit is 50.) "Does this mean my license will be lifted?" "That's up to the judge."

sound from the fork, however, that does the testing; the radar responds to the movement of the tuning fork's vibrating tines.

Metal foil was actually used in World War II to confuse antiaircraft radar. Bales of foil strips (code-named "window") were dumped from bombers to create dummy targets. The radar screens would be covered with pips, and the operators couldn't tell which pips came from the foil "window" and which from real planes.

The cops' radar is different. It doesn't hunt for solid objects, but measures the speed of every object that reflects its beam back. Festooning a car with foil only makes it reflect the beam better, so its speed registers more easily.

Doppler's wail. Inside the green plastic box, which is roughly the size of a TV set, are a dozen tubes and assorted

Ingenuity gone wild devised these radar-stoppers. None work



FOIL is favorite of would-be radar jammers, who often tie strips to the radio antenna. Actually, it makes a car easier to detect.



BEARING BALLS IN THE HUBCAPS are out of sight—but noisy. The clatter is supposed to disrupt the speed-radar operation. It doesn't.



GROUND STRAP is intended to make the car invisible to radar beam. Well, it protects the passengers against static shocks, at least.



ALUMINUM PAINT sprayed on fan blades is another popular dodge, another waste of effort. One man also tried luminous paint on car body.

electronic hardware arranged behind an array of eight small antenna elements that look like reject clothespins.

These antennas project a beam of very short radar waves and at the same time wait to receive waves reflected back at them. If the outgoing wave hits a stationary object—a car standing still—it bounces back unchanged. But if it hits a moving object, it bounces back with its waves slightly lengthened or shortened (depending on which way the object was going and how fast).

The reason: An object moving away from the radar waves stretches them out as it reflects them. The speed of the object adds just that much distance be-

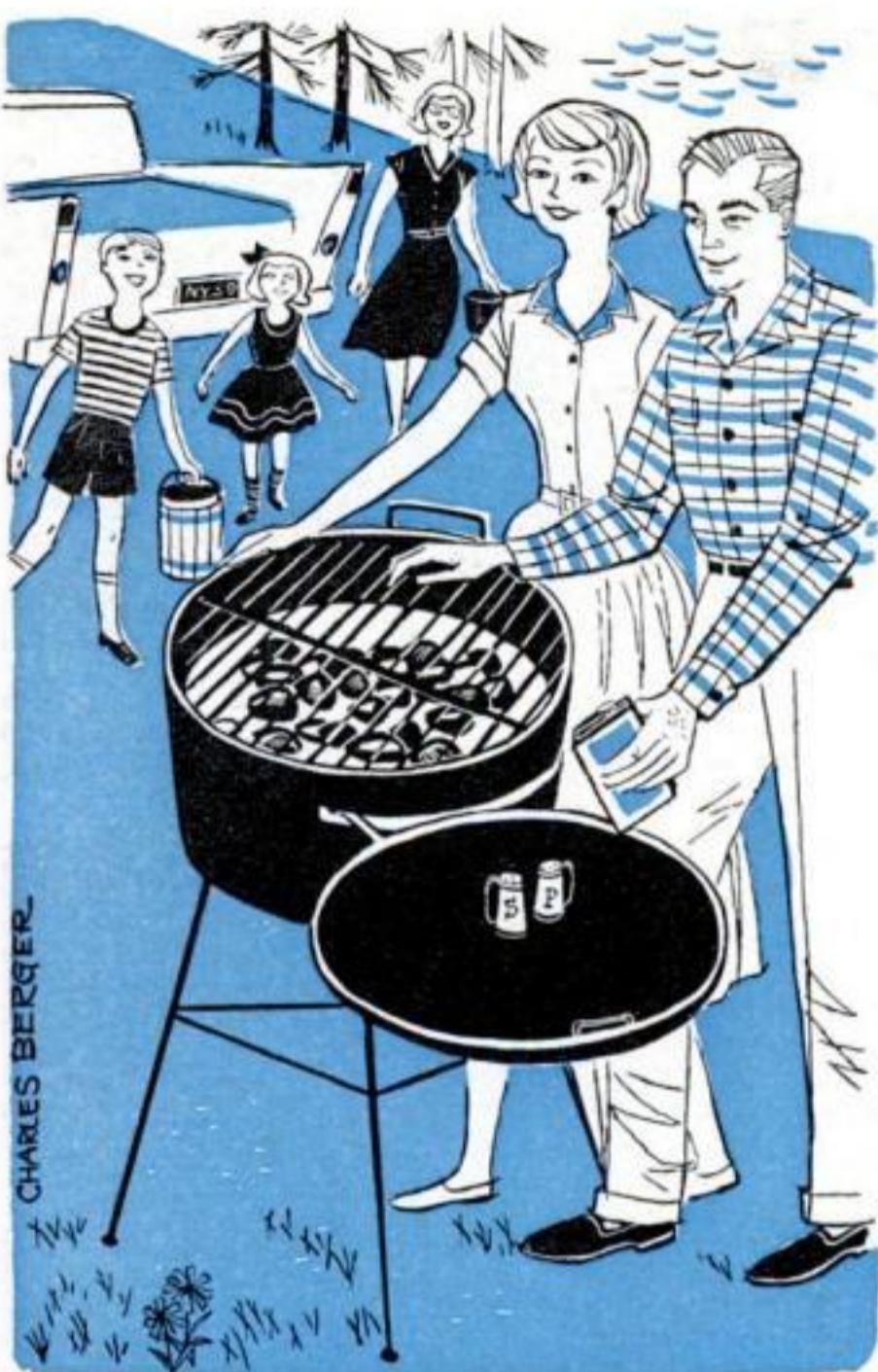
tween succeeding crests of the wave. An object moving toward the radar waves does the opposite, squeezing the waves together as it reflects them.

This is the Doppler effect, used for scientific measurements, but ordinarily noticed only when it changes the pitch of sound waves—it's what causes the up-and-down wail you hear when a car zips past with the horn blowing.

All the radar speed meter has to do is subtract the transmitted wave length from the received wave length. The difference tells how fast the object is going. If there is no difference, the object is standing still. The meter the cop watches

[Continued on page 232]

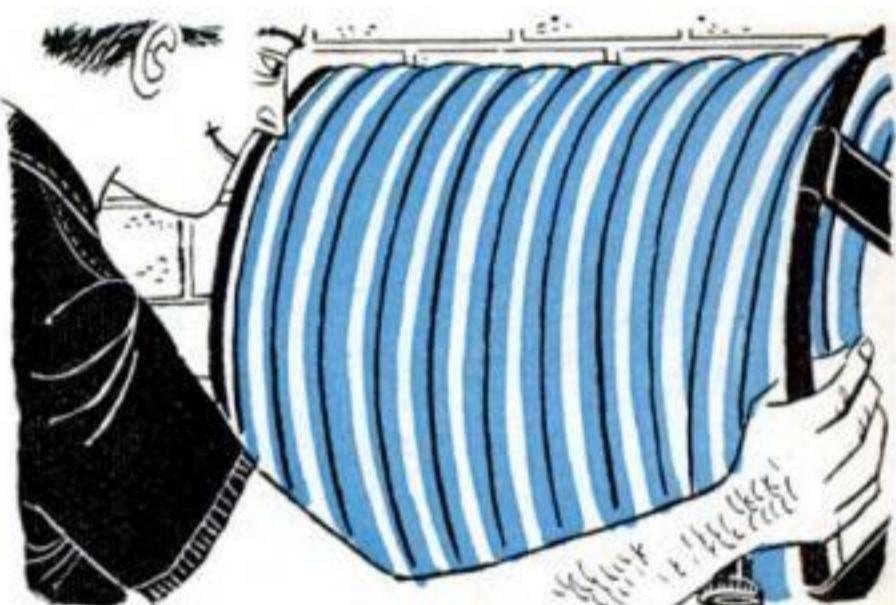
"I'd like to see them make..."



A PORTABLE GRILL WITH A STORAGE BIN for charcoal. A swing-out lid could cover the lower section. Pulled out, it would become a food counter.—W. J. Roche, Scranton, Pa.



LONG-LASTING FENCE PICKETS made of white plastic. Besides being rotproof, they'd do away with the chore and expense of frequent repainting.—W. H. Hoeft, Vancouver, Wash.



A WHITE LINE ON GARDEN HOSE. Running the length of the plastic tubing, it would signal if there is any twisting of the hose as it is reel-wound.—W. Dale Brown, Marietta, Ohio.



CAR MUFFLERS AND EXHAUST PIPES with flange and bolt connections. With fittings like that, removal or installation would be a breeze.—Robert E. Curlee, Winston-Salem, N. C.

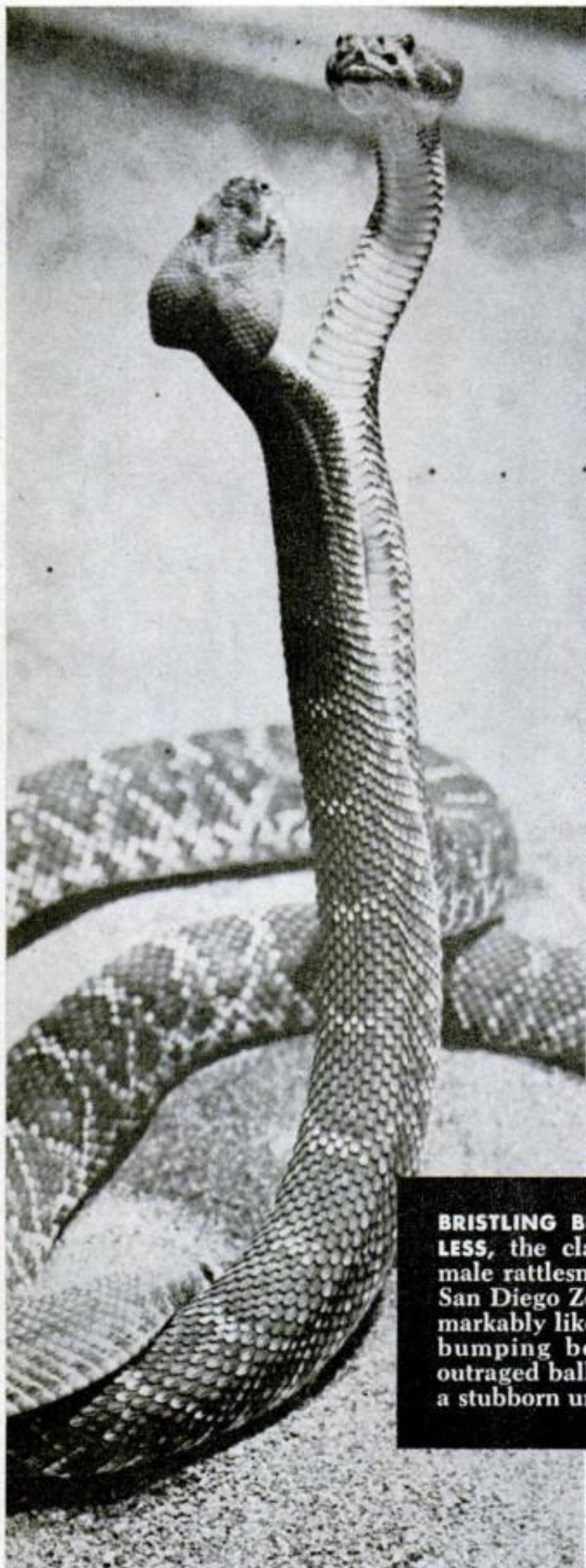


KNAPSACKS THAT OPEN OUT FLAT to make it more convenient for campers to find things. They might be cross-shaped and zipper-fastened.—Norvell Neitzke, Plainview, Nebr.

Everyone has his own pet idea of a gadget that he would like to see in general use. The five ideas illustrated above were suggested by POPULAR SCIENCE readers. What's

yours? We will pay \$5 for each one published. Please use Government postcards only. Write name and address clearly. Contributions cannot be acknowledged or returned.

What We're Learning from



BRISTLING BUT BLOODLESS, the clash of two male rattlesnakes in the San Diego Zoo looks remarkably like the chest-bumping between an outraged ballplayer and a stubborn umpire.



Animals

They often behave so amazingly like us, scientists find, that we may be doing what comes naturally oftener than we think

By George R. Price

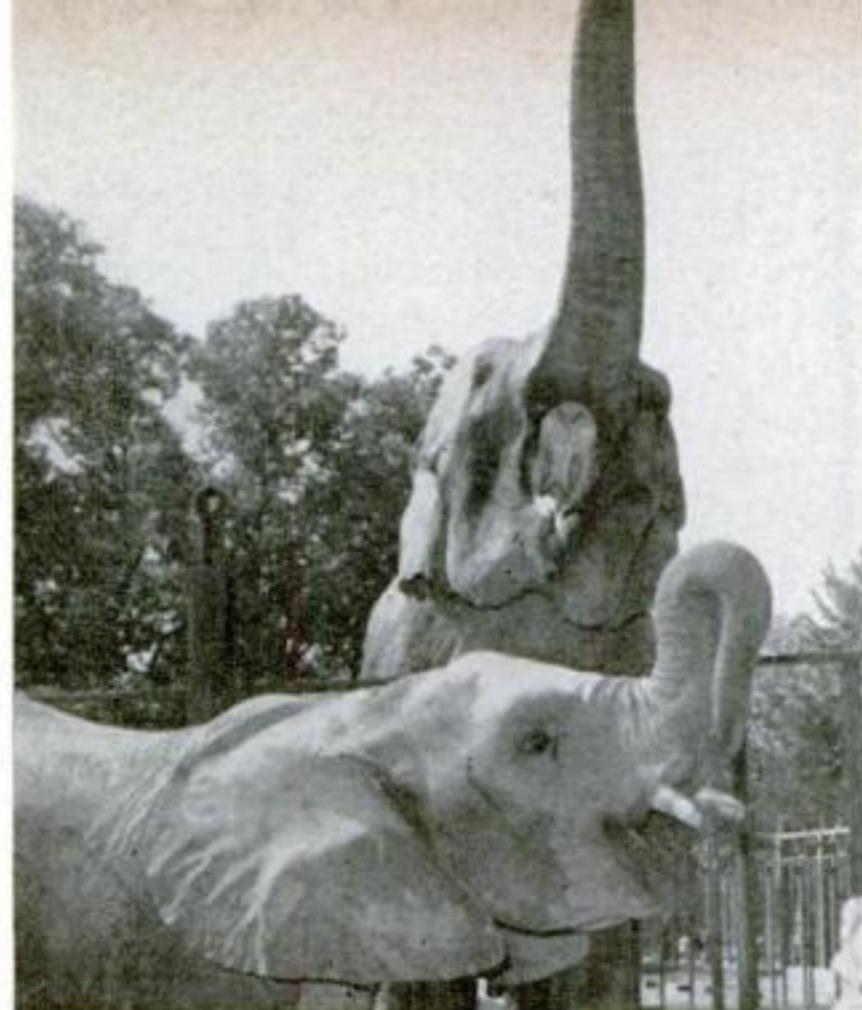
FASCINATING new clues to why we behave the way we do are coming from recent studies of how animals behave. Scientists have turned up such surprising parallels as these:

- Wolves in a pack obey a code of etiquette more strict and complex than that of any Oriental court.
- Bulls who tire of a familiar sexual partner revive spectacularly when given a wide choice of mates.
- Male rattlesnakes fight sham battles, coming to grips with each other but not using their poison fangs.
- Dogs raised exactly alike may be friendly and democratic or aggressive and domineering, according to breed.
- Mice can be trained to be ferocious fighters, who roar into activity the instant they see a strange mouse.

Such striking similarities to human behavior suggest that actions we usually assume to be products of civilization and education may only be the result of doing what comes naturally.

The most important drive for a wild animal, the impulse probes say, is neither sex nor hunger but self-preservation. Sex and hunger can wait; escape from enemies can't. Dr. H. Hediger, director of the Zurich Zoological Gardens, points out that the chief occupation of wild animals is constant watchfulness. He has found that nearly every one of them has a definite flight distance—about two yards for the wall lizard, 25 yards for the lion, 50 for the crocodile, more than 200 for the giraffe. When an enemy comes within this distance, the animal will run, hide or play dead.

Suppose an animal that escapes by



ELEPHANT COUPLES ARGUE, TOO, though they are among the most faithful of animal mates. Here, as often with humans, the lady (trunk raised high) seems to be dominating the debate.

running away is cornered? Most wild animals have what Dr. Hediger calls a *critical distance*, shorter than the flight distance. If the enemy approaches within the critical distance, the cornered animal instantly changes from defense to attack. It's the distance at which the snake strikes, the lion charges, the skunk discharges.

When an animal is tamed or domesticated, the flight distance and critical distance go down to zero as far as man is concerned. That's why we can walk



NATURAL DEFENSE for a baby appears to be his instinct to smile and thus win love for his protection. Lower animals inherit defensive instincts based on fear of natural enemies.

Darwin's "survival of the fittest" refers to the species,

right up and touch a dog, horse or cow. But the flight tendency has been especially hard to breed out of the horse, whose ancestors had no means of defense except running away. All too often, its flight reaction is set off with explosive force: It bolts, sometimes with fatal results to its rider.

Why do animals fight? If they are of different species, they usually don't—unless one is interested in eating the other. Animals of the same species rarely eat each other, but they frequently fight. And when they fight, it's usually male against male.

Curiously, though, this dueling be-



MARY'S LITTLE LAMB, like this Kentucky school pet, was obeying an instinct in most highly social animals that makes them become permanently attached to whoever is around them during a brief "critical period" early in life.

tween males is often a sort of ritual, with special weapons and methods of fighting not likely to kill or maim. Thus:

- Male giraffes duel with each other using their tiny horns. But when a giraffe is *really* fighting, as to save his life from a lion, he kicks.
- Bighorn sheep furiously charge at each other erect on their hind legs. But if one of the rivals stumbles during the run, the other stops and goes back to start the charge over again.
- With some animals, the fighting is pure make-believe. Howler monkeys, for instance, "fight" by howling at each other from a distance—like taxi drivers.

Why has this tendency toward sham

battling been produced by evolution? Because the law of evolution refers to survival of the fittest species, not the fittest individuals. If the males of a certain species settle their rivalries by just pretending to fight, rather than by killing, the species is more likely to survive.

The urge to be boss. One chief reason for battle, of course, is sex rivalry. Another is social rivalry—to determine which of two animals can dominate the other. A third reason is territorial rivalry.

Most animals stake out their private domains in woods or fields, marking the boundaries with their scent or in some other way. A male dragonfly patrols a territory a few yards long at the edge of a pond. A pair of sparrows guards about an acre; a pair of hawks, two or three square miles. A pack of howler monkeys considers three or four square miles its own. A pride of lions will lord it over a dozen square miles or so.

Within the home territory, animals of another species are usually welcome, but trespassers of the same species, especially strange males, are driven away. (The human male, too, is usually tolerant of a dog, cat or bird that enters his yard, or even a strange human female, but let him encounter a strange male of his own species on the premises and there may be the devil to pay.)

Life in the wolf pack. Among all wild animals, close to the finest character is found in that much maligned animal, the wolf. The American naturalist Adolph Murie, studying the wolves of Mt. McKinley National Park, discovered that most of them take but one mate, and for life. (This is rare behavior among mammals.) Also, the male wolf is one of the best of animal fathers, devoted to his pups, defending them, bringing them food, doing everything but nurse them.

Probably it's no coincidence that there are many legends of human babies raised by wolves. The wolf is one of the few wild animals sufficiently gentle, friendly and affectionate to care for a helpless human infant. Also, it's no coincidence that the wolf was the first animal domesticated by man. Dog owners who say their pets are "almost human" aren't just being sentimental. In lots of ways, dogs and wolves are almost human.

not to the individual

A German scientist, Rudolf Schenkel, discovered that every motion a wolf makes has to be carried out in a particular way according to his status in the pack. The expression of his face, the way he holds his ears, the position of his tail, the bristling of his fur, the elevation of his head—these all have meaning. He carries himself one way when approaching his social inferiors, quite another way when one of his superiors approaches him. And he has to be letter-perfect in his complex etiquette, for any mistake is punished swiftly and ruthlessly.

Every breed of dog, from Chihuahua to Great Dane, is probably descended from Northern European wolves, first domesticated about 6,000 years ago. These 60 centuries of breeding have given dogs greater variation in shape and behavior than any other species of animal. It is a fascinating puzzle to try to unravel just what part of dog personality is due to heredity, what part to the environment man has created for him.

At the Jackson Memorial Laboratory, in Bar Harbor, Dr. J. P. Scott and his co-workers have been studying this problem for several years. Some of their findings:

- Beagles explore more than most other dogs. This results from centuries of breeding for good hunting qualities—a hunting dog should search around. Also, they seldom quarrel among themselves, for they were bred to hunt in packs, where fighting is decidedly undesirable.

- Terriers, on the other hand, bred as fighting dogs, tend to be bold and aggressive. They try to dominate one another, and any other breed not too big.

- Cocker spaniels are especially likely to lie flat on their bellies when frightened.

THESE WOLF CUBS, in a photo from the American Museum of Natural History, show their strong kinship with dogs. They can be domesticated if taken before their eyes open.



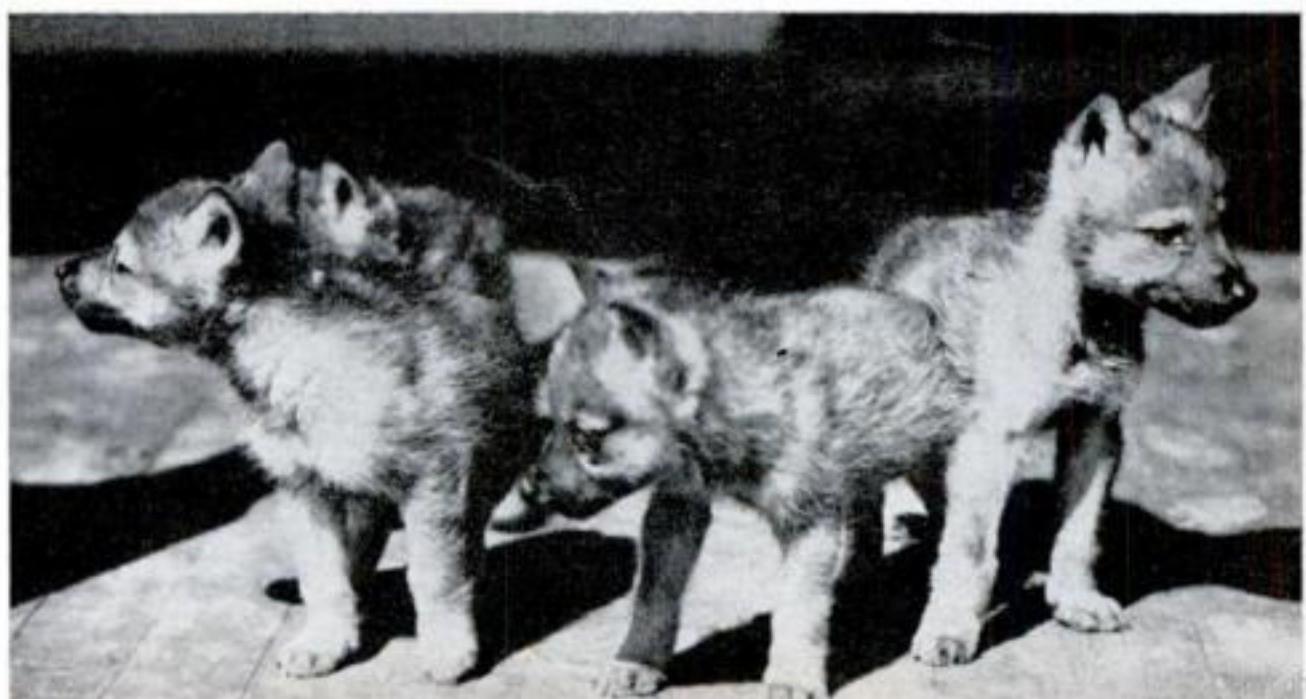
TRAINING A TIGER or a lion to mount a pedestal and sit there involves taut-nerved toying with two instincts basic in most wild animals (and common in man). They are the urge to run if an enemy appears far enough away to make flight feasible, but to attack if he comes too close.

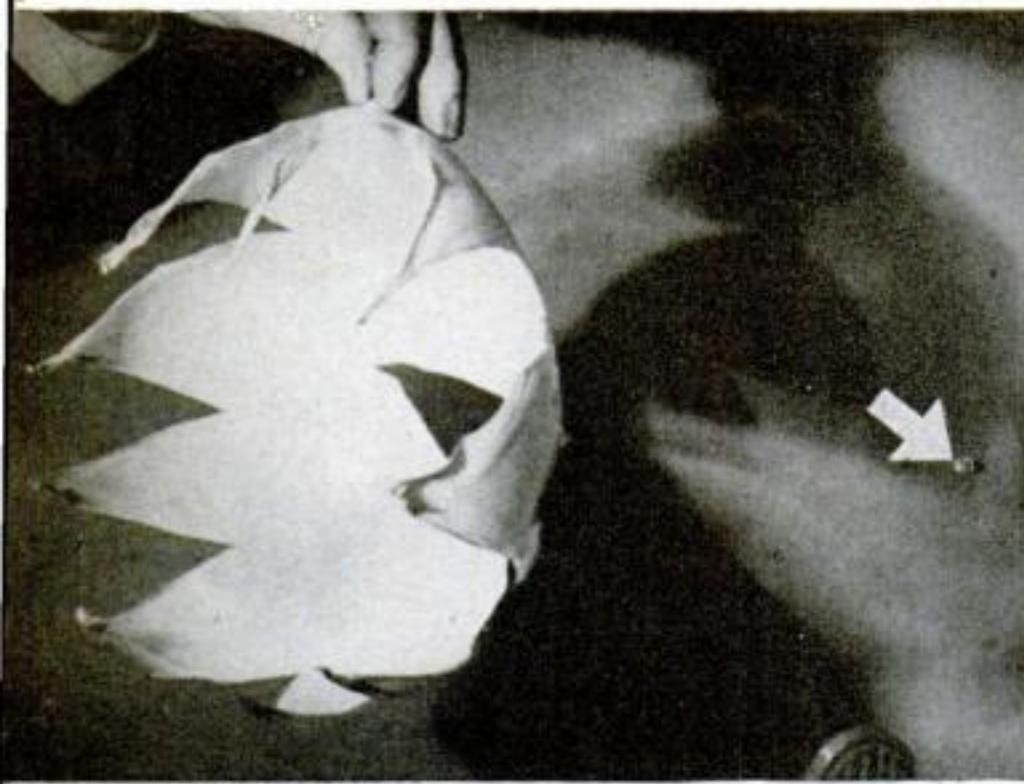
This was bred into them back in the Middle Ages, Dr. Scott explains, when they were used for hunting birds with nets. They were supposed to find the birds, then hug the ground while a net was thrown over both dog and birds.

Surprisingly, sex plays a much smaller role in the animal world than in our lives. Among the great majority of wild animals, mating occurs during only one or two periods a year (usually in the spring or fall), lasting from a few hours to a few weeks. In fact, some species are known to mate only on a single day once a year.

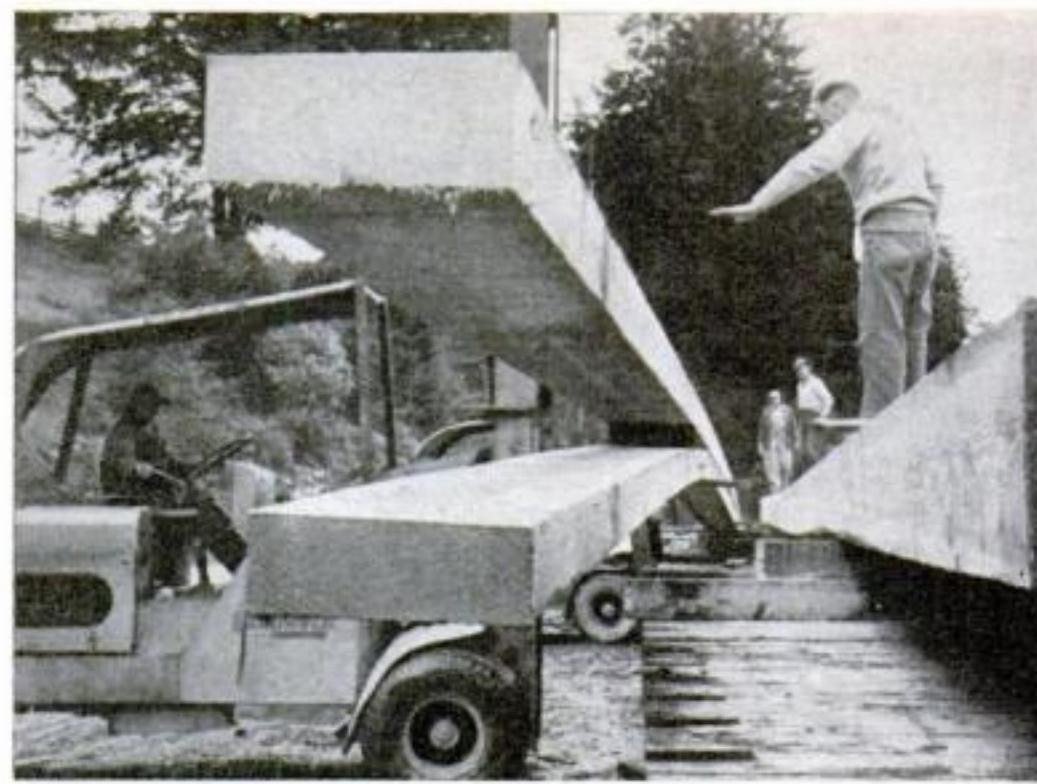
The rat is a rat. Animal couples differ considerably in degree of faithfulness. The Norway rat and the common house mouse are completely promiscuous. Male sea lions and baboons collect in their harems as many females as they can defend against other males. Rhesus mon-

[Continued on page 238]





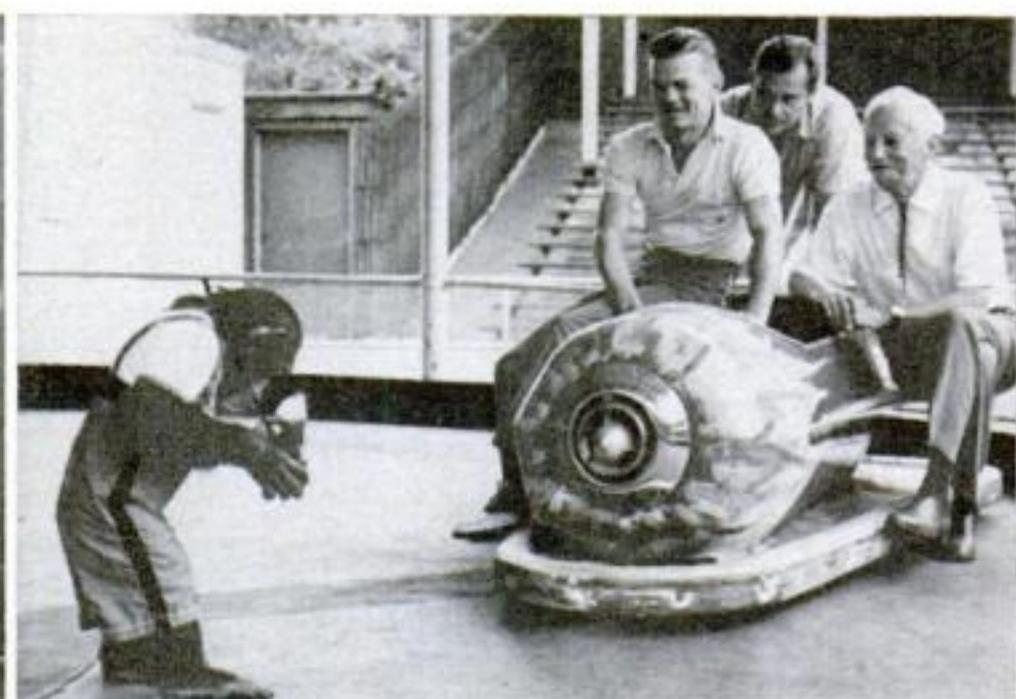
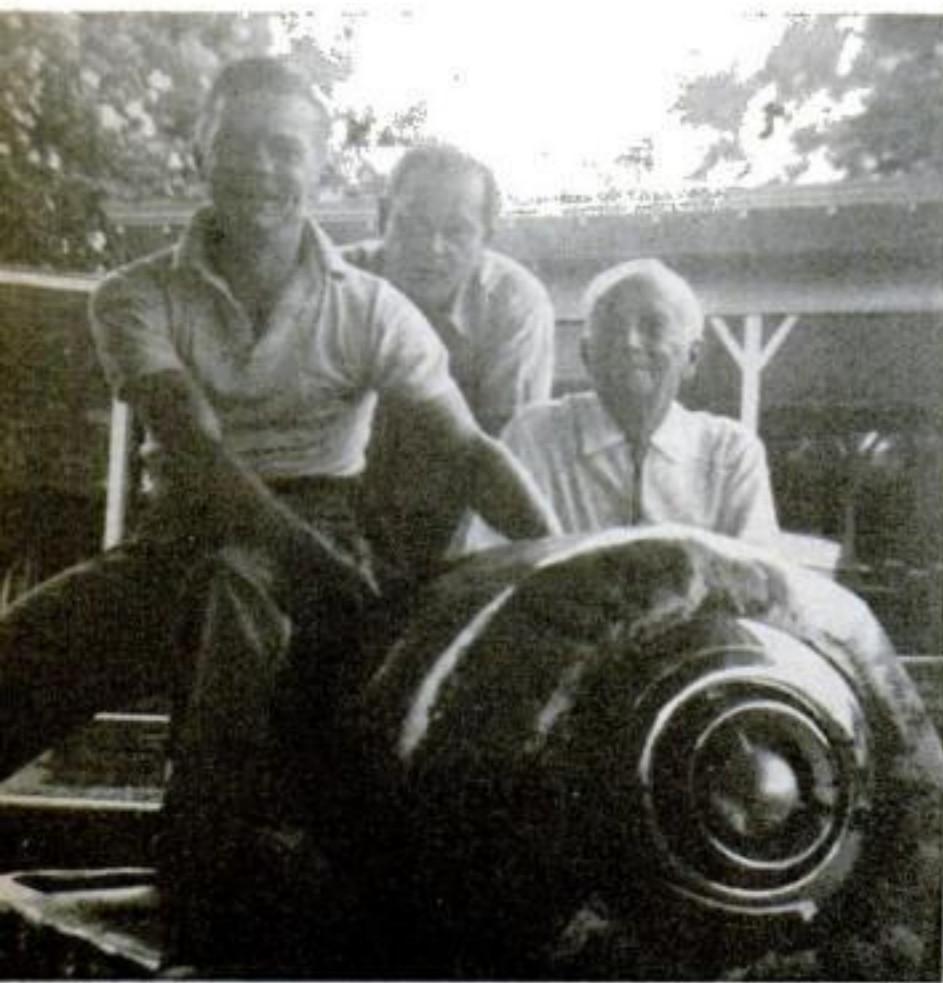
BURSTING BALLOON. Here a .22 rifle bullet (arrow) punctures a balloon at MIT in a 1/2,000,000-second photo. Mike (right foreground) picked up discharge that set off the strobe light.



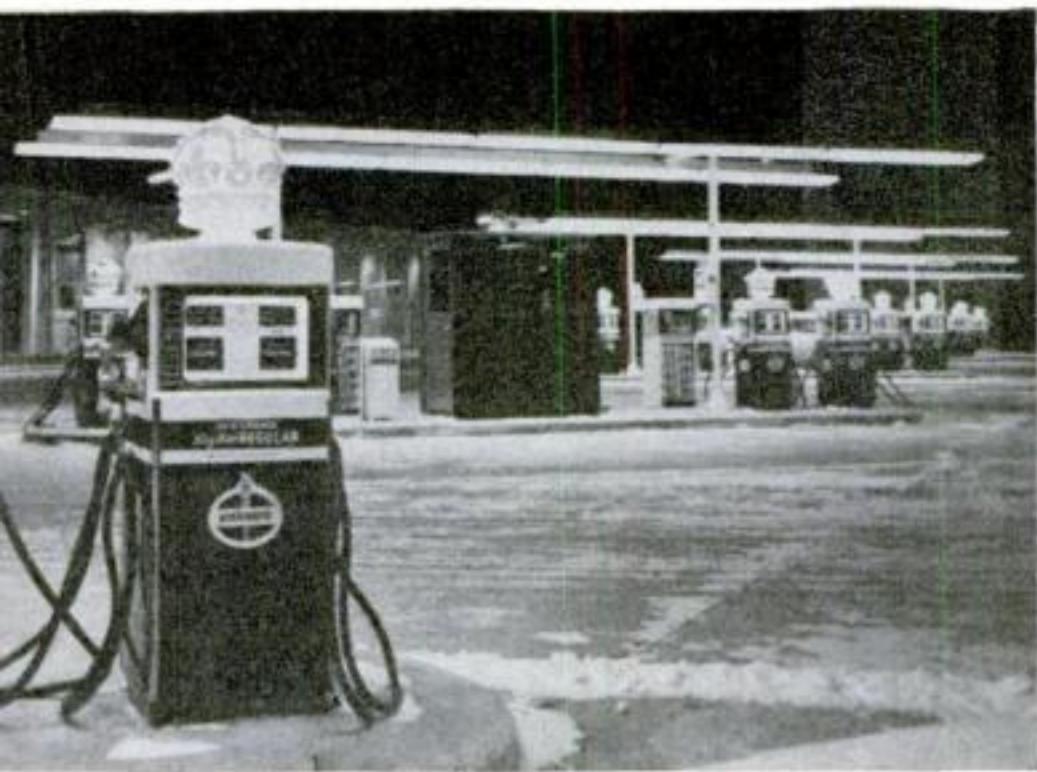
GIANT PLANKS. Trees specially felled in Oregon provided these 100-foot planks for piers at Jersey City, N.J. Each is nine inches thick by 16 inches wide. Double flatcars hauled 24 of them.



WALL CLIMBER. This Swiss truck can arch its back to climb a wall, reverse the process to cross a ditch, and turn in its own length by raising one pair of wheels. Front and rear wheels are independently carried on



MONKEY SHINES. It's disconcerting when animals at the zoo take *your* picture. Here Duke, a prize chimpanzee at St. Louis' Forest Park, snaps the director and trainers. At left, the result. Excellent contrast, too.



NIGHT INTO DAY. Fluorescent fixtures above, 40 feet long by 10 feet wide, are said to be the largest made. They were designed by Petelco, Inc., for service stations on the Illinois Tollway.



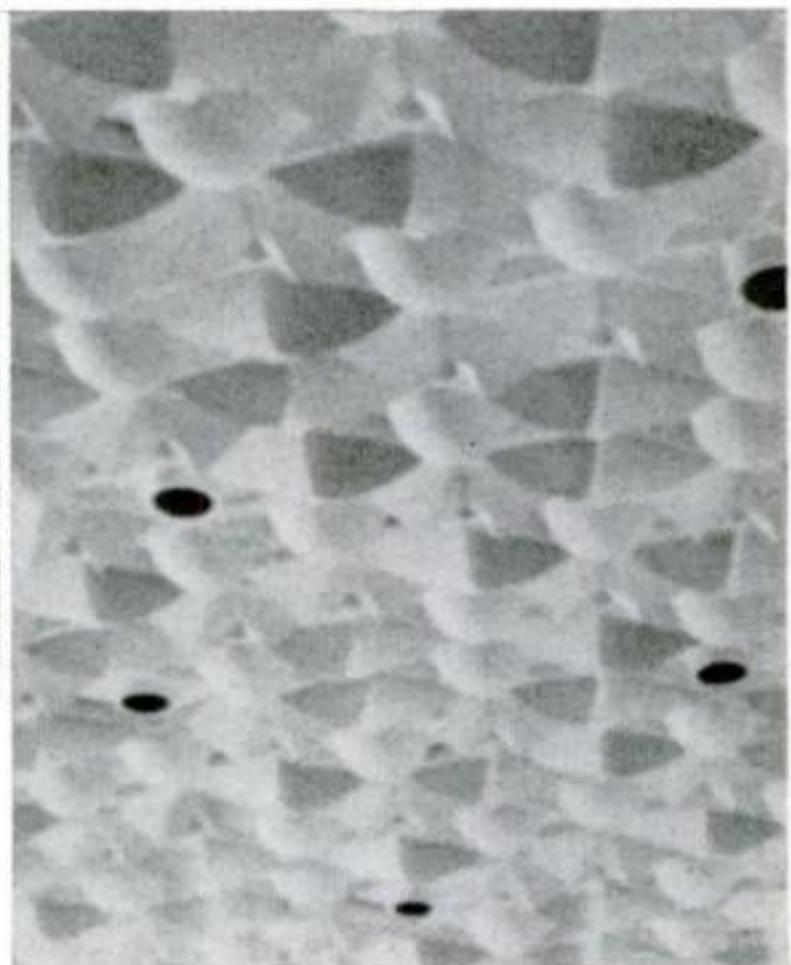
RIDING A GALE. A drafty thrill awaits the skier pulled by this propeller. Driven by a 5½-hp. motor, it makes up to 30 m.p.h., says its inventor, a Bavarian winter-sports enthusiast.

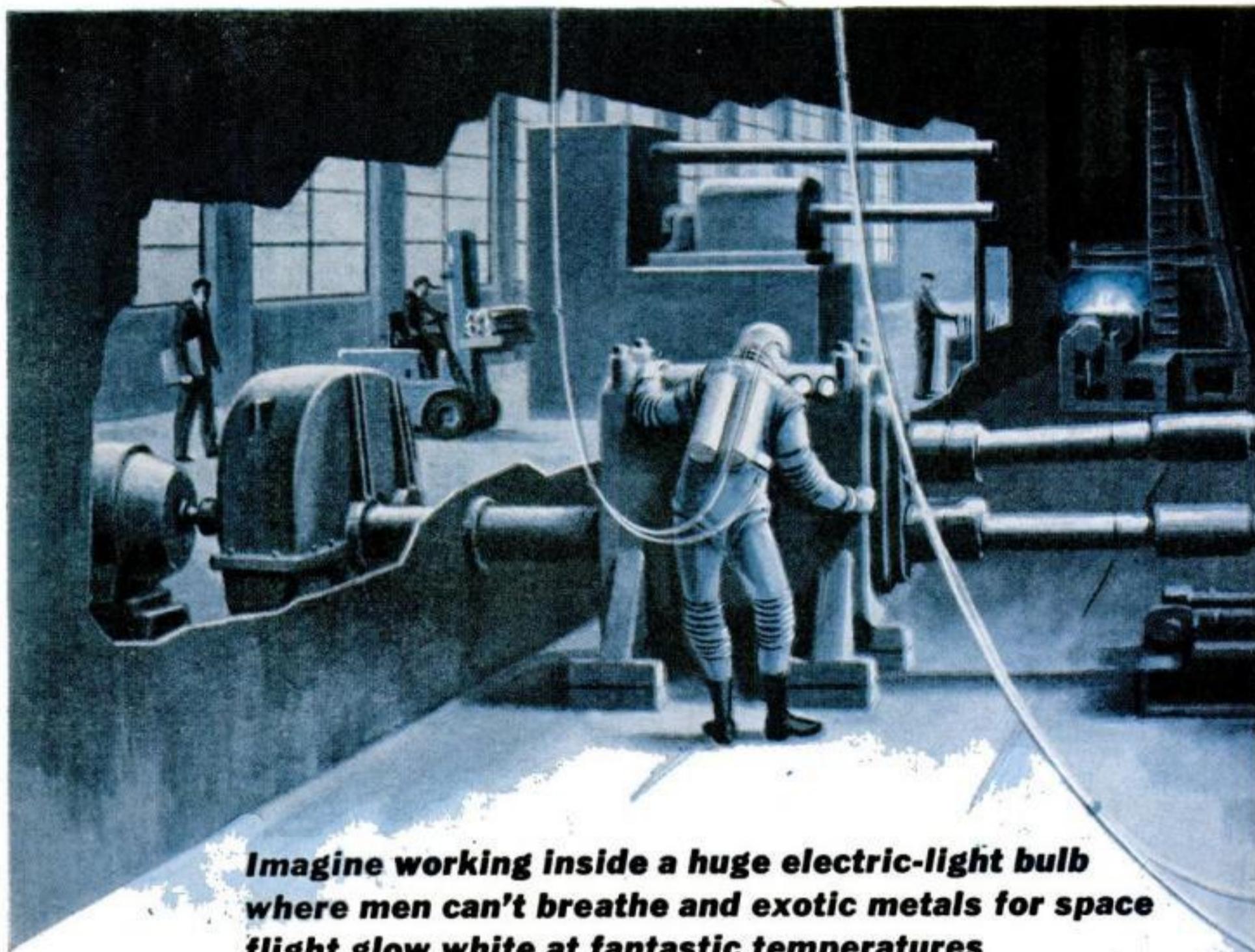


beams pivoted on a central axle and driven from it by chains housed in hollow arms. The beams are linked to the chassis by a system of hydraulic rams that are controlled from the cab to regulate wheel position.



SOUND CEILING. Half spheres, pyramids and other shapes filled with glass wool form a unique acoustic ceiling for the new Beethoven Hall at Bonn, West Germany. Locally it's called "moon surface with sputniks."





Imagine working inside a huge electric-light bulb where men can't breathe and exotic metals for space flight glow white at fantastic temperatures

Workers Wear Space Suits in New Gas-Filled Factory

EXOTIC metals that can survive the heat barrier of hypersonic flight soon will be mill-worked at a white-hot 4,000 degrees in a forbidding atmosphere of argon gas, similar to that inside an incandescent light bulb.

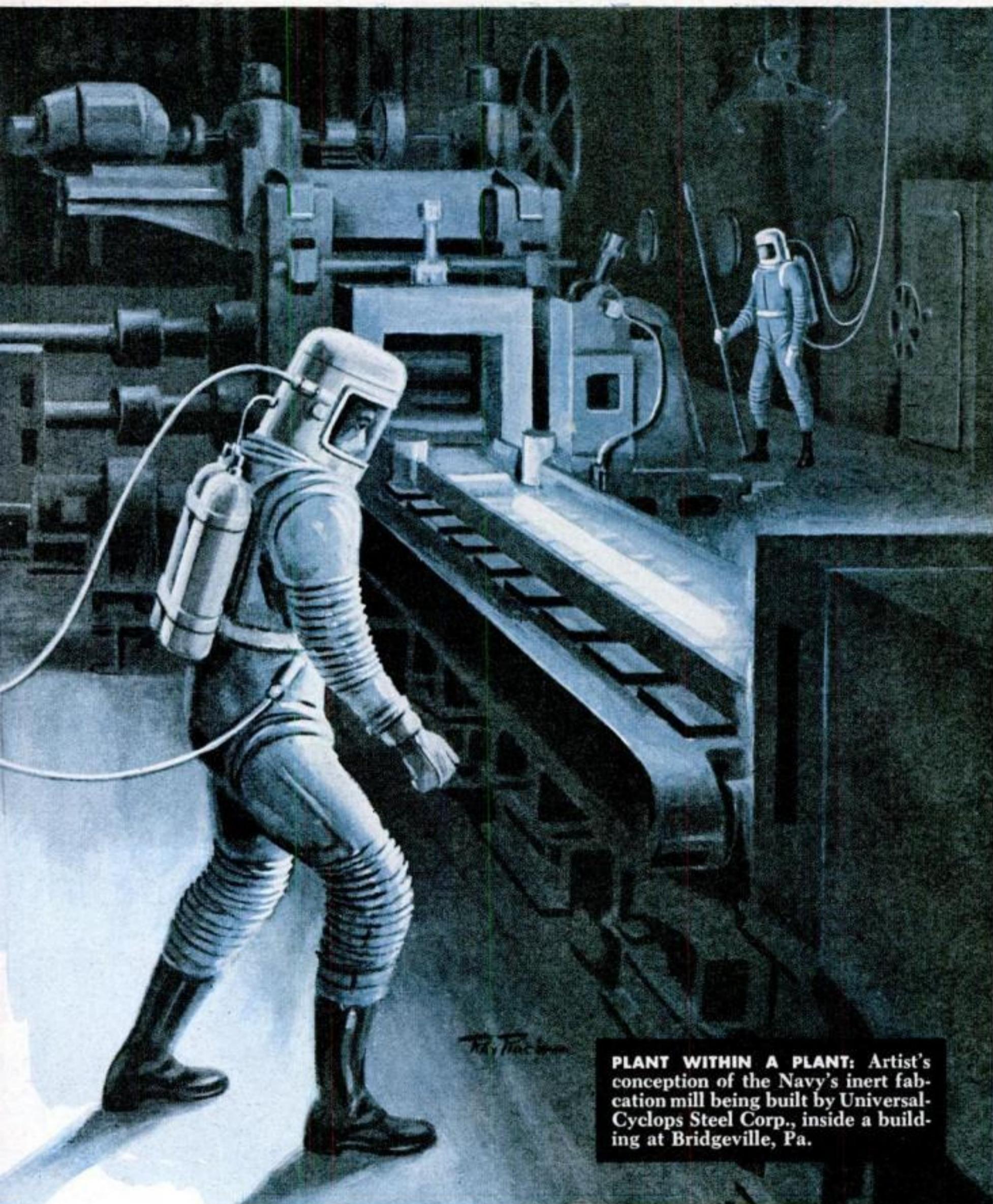
Men working in this out-of-the-world gas-chamber metal mill will wear "space suits," trailing umbilical cords plugged into air-breathing and exhaust manifolds.

Should a lifeline break, a man might live a minute or two—as helpless as if he were out in space or under water without an oxygen supply. Crash doors will provide a quick escape. But in case he

is injured or some obstacle gets in the way, he will have an emergency air capsule to keep him alive until rescue comes.

"Fire cannot burn in it." Argon, a rare element in air, is a by-product of plants that extract oxygen and nitrogen from air. It is an inert gas, which means that it does not react with other materials. Fire cannot burn in it, because there is no oxygen. In an incandescent light bulb, it protects the delicate filament from burning out.

In the new In-Fab (inert-fabrication) plant, argon will be used for much the same purpose. Metals known as "refrac-



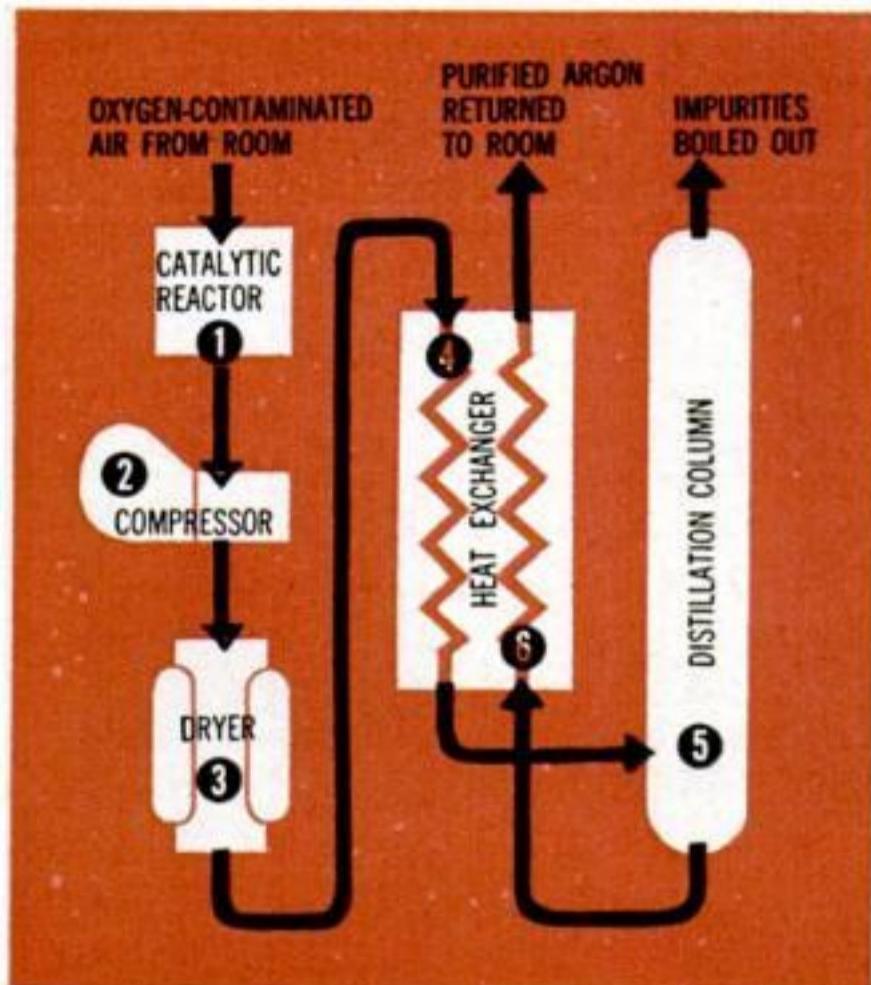
PLANT WITHIN A PLANT: Artist's conception of the Navy's inert fabrication mill being built by Universal-Cyclops Steel Corp., inside a building at Bridgeville, Pa.

tories," which maintain their strength at extreme temperatures, do not get along with two enemies contained in air—oxygen and nitrogen—when raised to the heat at which they are best worked.

One of the most promising of these refractory metals at present is molybdenum.

To achieve maximum strength it should be fabricated at 80 percent of its 4,752-degree melting point. At that heat, oxygen attacks the metal with a violence that not only causes internal damage, but raises great clouds of obscuring smoke.

To prevent this, the argon atmosphere



HOW CONTAMINATED ARGON GAS IS PURIFIED:
(1) oxygen becomes water; (2) gas heated; (3) water removed; (4) gas cooled; (5) other impurities removed; (6) pure argon reheated.

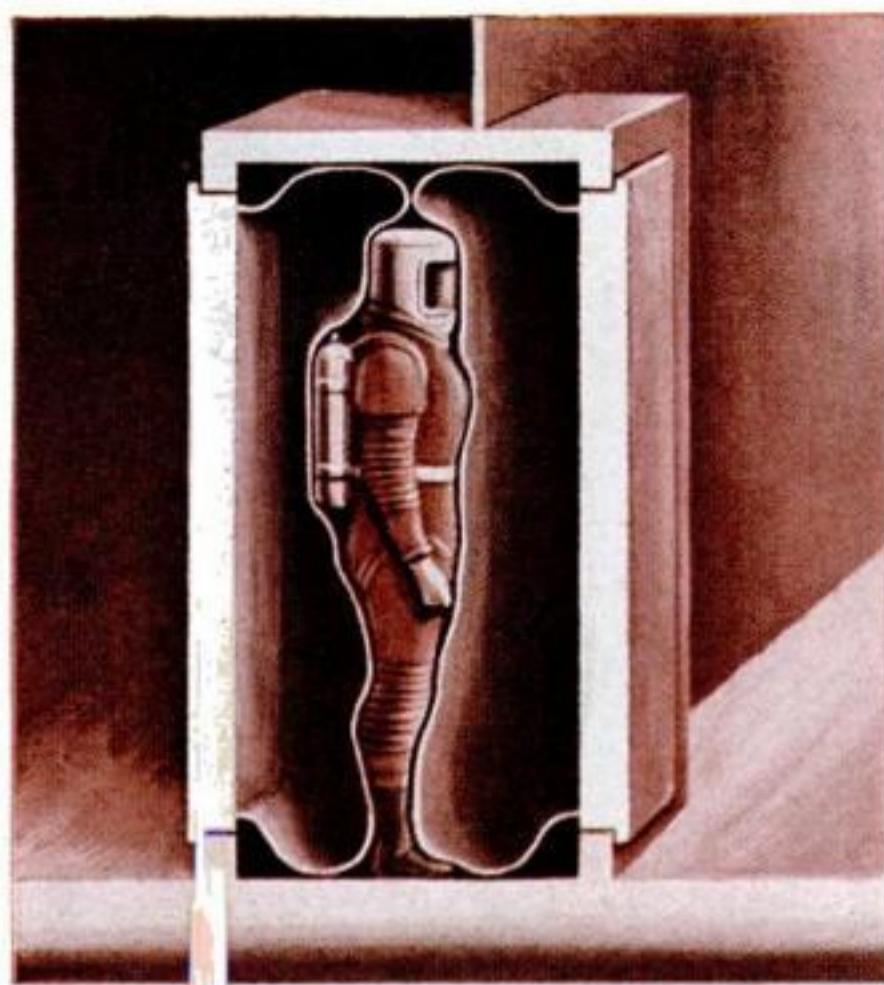
in the \$3,000,000 pilot plant will be kept so oxygen-free that if the glass of a light bulb were broken, the filament would continue to glow. To accomplish this, the chamber, 40 feet by 80 feet, and 25 feet high, will be as airtight as welded steel plate can make it.

Leakage is "out." Also, the argon will be at a slightly higher pressure than the outside air, so that what little leakage there is will be argon *out*, rather than air *in*. But despite precautions, there will be some leakage, such as from the suit itself, with an air-breathing man inside.

An argon recirculating and purifying system will take care of that. It will renew the atmosphere every three hours, cleansing the gas, keeping oxygen and nitrogen content down to less than 50 parts in a million.

When the chamber is filled, argon will not be pumped in directly, since it is expensive, and some would be lost in mixing with air. Instead, the recirculating system will be used to force nitrogen in through ceiling diffusers, and withdraw air through floor registers. Then argon will be pumped in, replacing the nitrogen in the same way.

Cooling will be a problem, since glowing metal would soon send temperatures soaring to furnace heat. Even with the argon passing over a cooling unit, it will



DOOR PERSONNEL LOCK is lined with plastic diaphragms that hug the contour of a man, excluding most of the air when he opens the door into the gas chamber.

be hot, space station. And they will have insulation to protect men working close to white-hot metal.

The men will be there mostly to observe, a suitable "pits," will work in an impactor billets converter. Each will have its own electric induction furnace for heating the metals. An open-hearth furnace would be impossible, since argon gas will not support combustion.

Other metals later. The In-Fab plant was designed for molybdenum. It will, however, be adaptable for practical hot-working of other refractory metals, such as tungsten, rhenium, tantalum and columbium, at temperatures that have so far been impossible outside the laboratory and experimental setups.

From these tough metals will come the heat-critical parts for faster jets and hotter rockets, and for the nose cones and leading edges of missiles and space craft that, re-entering the earth's dense atmosphere, will be subjected to temperatures that would melt or vaporize ordinary metals.—*Herbert O. Johansen*.

WHEELED BOAT.

With its wheels retracted and a 25-hp. outboard put-putting aft, this trailer becomes a houseboat.

It's called a Yachtel (accented like "motel") by the developer, Rankin Harrison of Cincinnati. The 32-foot unit has an all-steel welded hull, cruises at 10 m.p.h. It accommodates four with a living room, kitchen and dinette, two wardrobes, patio-deck and bath.

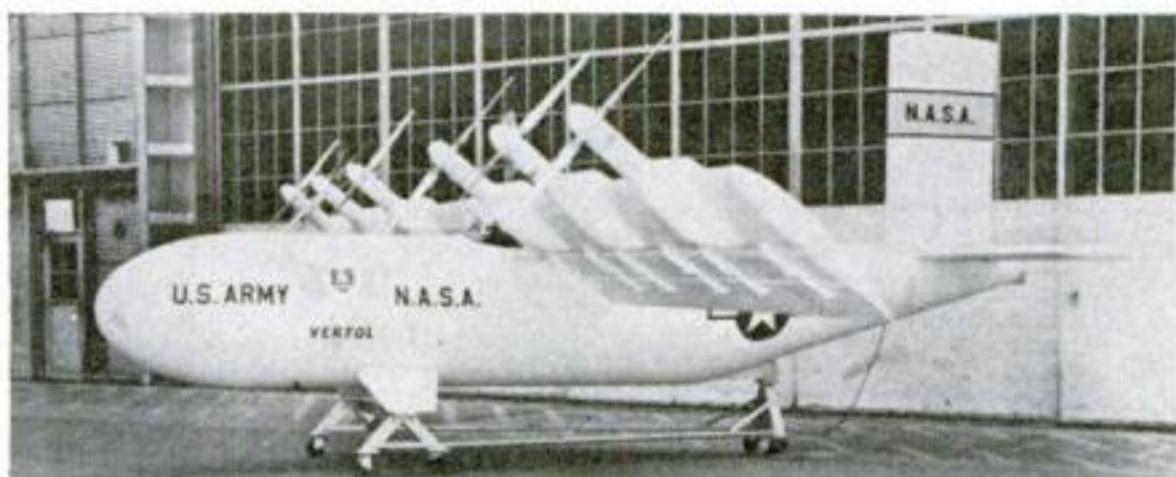


BUMPER BUFFER.

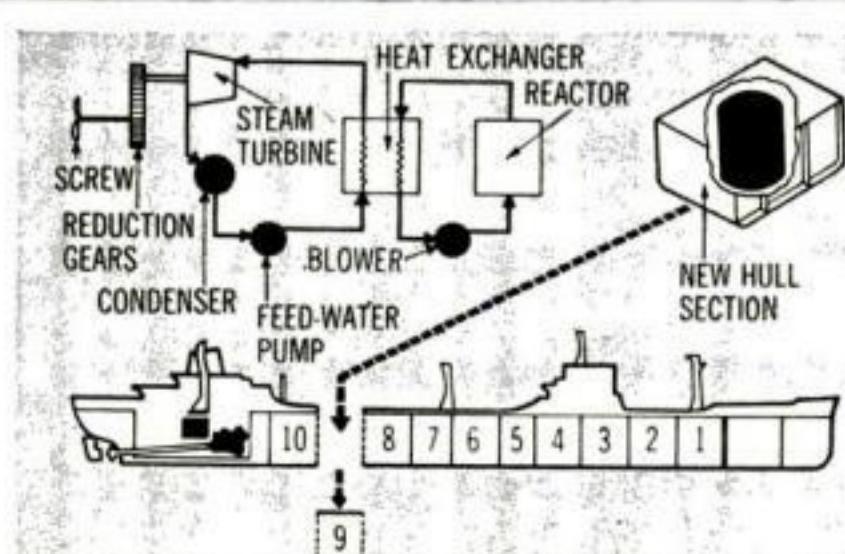
Rubber cones plug into "portholes" (far left) in the Vauxhall Victor's bumpers to save chrome, front and rear, when parking or garaging. They conform to the bumper design, are attached by a single center bolt.

SIX-ENGINE TILT.

The model at right, built by Vertol for Army tests in a wind tunnel, has four more propellers than other tilt-wing planes. Like them it can take off with wings vertical or at an angle. In flight, wings are horizontal.



BUILT-IN REACTOR. Tanks like the Hans Isbrandtsen above can be nuclear powered with custom-built reactors, says Ford Instrument Co. A section of the old hull would be cut out, a new one containing the reactor welded in.



THE LITTLE FOREIGN CARS:

Who Says They

DAZZLED by the annual convulsions in Detroit that produce "all-new" cars when each model year rolls around, most Americans see virtually no changes in the little imports from over the water. Actually this is an illusion.

A steady stream of minor "running

changes" is gradually transforming the little fellows. By contrast with the flamboyant drum-beating of U. S. auto makers, these changes often go unheralded. Nevertheless they make a real difference to owners of imports.

All Volkswagens, for example, may



TURN SIGNALS were moved from VW centerpost on the sides (left) to the top of the front fenders. Front windshield was enlarged.



INSIDE THE VW, later model (right) had an offset shift

Volkswagen. There are more Volkswagens in the U. S. than any other import—over 300,000 at last count. Early postwar cars had mechanical brakes and plastic rear windows. And they lacked synchronized transmission gears and chromed bumpers. By 1949 the

bumpers were chromed and the windows were glass; by 1950 brakes were hydraulic; and by 1952 synchromesh transmissions had eased shifting.

In late 1953 the engine was enlarged to develop 36 hp. The two tiny rear windows became one slightly larger glass.

English Ford. The Anglia, designed in 1952, is Ford's most popular import. Early cars sold here had "flipper" turn signals and tan leatherette interiors. By August, 1956, Anglias were arriving with colorful interior fabrics and several new body colors. Blinker lights replaced "flippers."

A modest grille change occurred in 1957. For 1958 there was a locking glove compartment with a hood-latch release hidden inside, in place of the open package shelf. A new grille and tail lights, bumper guards, and chrome body strips also appeared. The 1959 cars have 11 body colors, 33 interiors.

Fiat 600 & 1100. The 600 arrived here in July, 1957, and remains substantially the same, except for brighter-colored upholstery and chrome strips to protect body paint.

The 1100 sedan, introduced at the same time, went unchanged for nine months. Then in March, 1958, a new grille and wraparound bumpers appeared outside. The fog light of earlier models was gone. There were larger, self-centering brakes, new synchronizing rings in the transmission, and a redesigned intake manifold that added one horsepower. The rear seat no longer folded forward.

Don't Change?

look identical to drivers of Detroit iron. But if you point out a VW to an initiate he can tell you what year it is by a glance at the rear window, tailpipes and turn-signal lights. Thus, without any stupendous retooling effort, the European car builder maintains a separation be-

tween model years. In the muted atmosphere surrounding little imports these differences are often compelling enough reasons for trading in the old model for a new one.

Here, make by make, is what has been happening to the small imported cars.



lever, lower steering-wheel spokes, and an armrest.



LARGER REAR WINDOW gives better visibility to rear in newest models. Separate stoplights were dropped and a second tailpipe added.



Less than a year later VWs had bumper over-riders to fend off predatory Detroit monsters. In 1956 the steering-wheel spokes were lowered to give a better view of the instrument panel, the gearshift lever was jauntily tilted to make it easier to reach, and thinner front seat backs

gave rear-seat passengers more knee room. Cars for 1957 offered tubeless tires, vacuum distributor control and improved torsion-bar suspension.

The latest model has a larger rear window, flat gas pedal, new instrument panel and brake-pedal mounting.

Vauxhall Victor.

Built by GM's British subsidiary, the first 500 sedans reached here in August, 1957. Six colors were offered on early models, with two more added later. Two-tone wagons arrived in May, 1958. There are now 10 outside and five inside color combinations.

On '59 models there is a new, wider radiator grille, with a broader radiator behind it. An "eyebrow" in the roof over the windshield has been replaced by a clean curve. New oval lenses cover combined parking and directional lamps. The front bumper now wraps around and there's new chrome.

Hillman. First imported into the U. S. in 1947, the Hillman was given a new interior in 1950; and over the next few years, minor changes in chrome and instrumentation. Then, in 1955, Hillman switched to a new overhead-valve engine.

For 1957 this same engine powered a car with completely new chassis and body. This meant a new grille and tail lamps, broadened bumpers and less outside chrome. The gas-tank filler pipe was moved from the left side to the back, below the trunk lid. The '59s have revamped instruments, brighter interiors, a new grille, chrome strips.



DAUPHINE'S FRONT END became less vulnerable with the redesigned, beefier bumper shown at right.



REAR END IS STAUNCHER, TOO. Reinforcing the original bumper with a guard rail did the trick.

Renault. Dauphine popped off the assembly line in January, '56, and two years later found itself second in U. S. foreign-car registrations. Improvements began July, 1956, when the shock absorbers were revalved. Blinker lights, mounted abaft the rear doors, were moved to the front fenders in April, 1957. At the same time, shock absorbers were again changed and brake drums fitted with three stud bolts for a standard disk wheel. (Earlier Dauphines rolled on "star-type" wheels—rim and tire bolted on.)

A month later heavier wire connected the battery to ground and starter motor. The 1959 Renault Dauphines have an 8:1 compression ratio and a 12-volt electrical system.

Opel. The early ones (they're made by the German branch of GM) arrived in October, 1957, with headlights that failed to meet many state laws. Buick dealers who sold the car installed American-made sealed-beams with approved aiming characteristics. Opel then began using U.S.-made lamps in its export models.

At the same time, laminated safety glass appeared on American Opels. Parking lights on centerposts were covered with bright metal because the white-to-front, red-to-rear lenses were unlawful in California. In 1959, white-wall tires became optional.

Triumph. In April, 1958, right after they came to the U. S., the Triumph wagons had their rear-door hinges switched right to left, so the open door would not block loading with the car parked at a right-hand curb. In August a combination ignition and starter switch was introduced. A heavier floor mat came in September, and center door pillars trimmed to match upholstery came in November.

December, 1958, models had a redesigned clutch and brake pedals, a clear plastic coating over the original rubber gearshift knob and a reserve fuel valve in the gas line.

Simca. Changes on the Simca, now imported and sold by Chrysler Corp., have been slight since 1951 when a major change was made. In 1956, however, the car was dressed up with a new grille, parking lights and chrome strips. At the same time, die-cast plastic dash panels and glove-compartment doors were installed. A boost in performance came from increasing the bore from 2.83 to 2.91 inches—displacement went from 74.4 to 78.7 cubic inches as a result.

Changes made in 1959 models include a wraparound rear window, new front and rear profiles, new dash.

Volvo. The October, 1956, arrival of these Swedish cars was still news when bumper guards were added. More performance came in June, 1957, when the 70-hp. engine was jumped to 85 hp. A heavier three-speed transmission and new grille and chrome fender molding completed changes.

In June, 1958, a four-speed, fully synchronized gearbox came along. A one-piece windshield, larger rear windows and larger tail lights followed in November, 1958. Last January, brake drums grew from nine to 10 inches, the steering gear was revised, and a new instrument cluster was installed.



SKID CHAINS. Wearing automobile-type chains over her shoes, this West German fräulein is safe from slipping on ice or snow. The lightweight chains can be worn on men's or women's shoes.



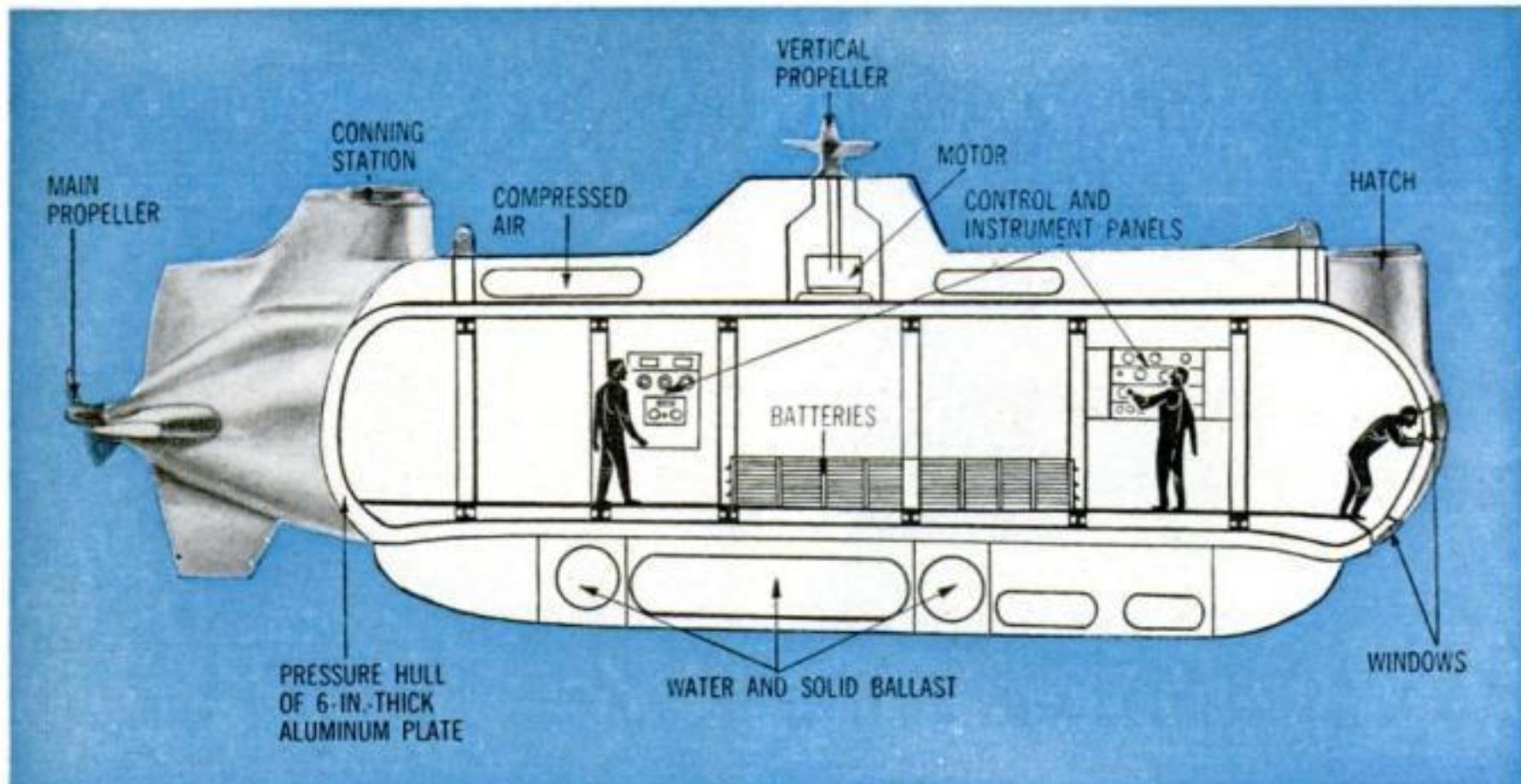
SPINNING PLATE. A new game the maker hopes will become a fad like the hula hoop consists of a stick and plastic dish. Object is to keep the plate whirling. A deep rim makes it fairly easy.



FUTURE GI. Keyhole peek at what the atomic war's fighting men may wear. New Army developments shown at Fort Ord, Cal., are this transistor-radio helmet, heat-resistant mask, nylon armored vest and automatic aluminum-alloy rifle that fires at a rate of 700 rounds a minute.



SEDAN-PICKUP. Latest model of the German Hansa 1100 is a family car by night, pickup truck by day. For conversion, the rear seats slide under the front; cargo is loaded through the trunk.



Cutaway drawing of projected deep-sea-exploring submarine shows details of novel design.

Sub to Probe Record Depths

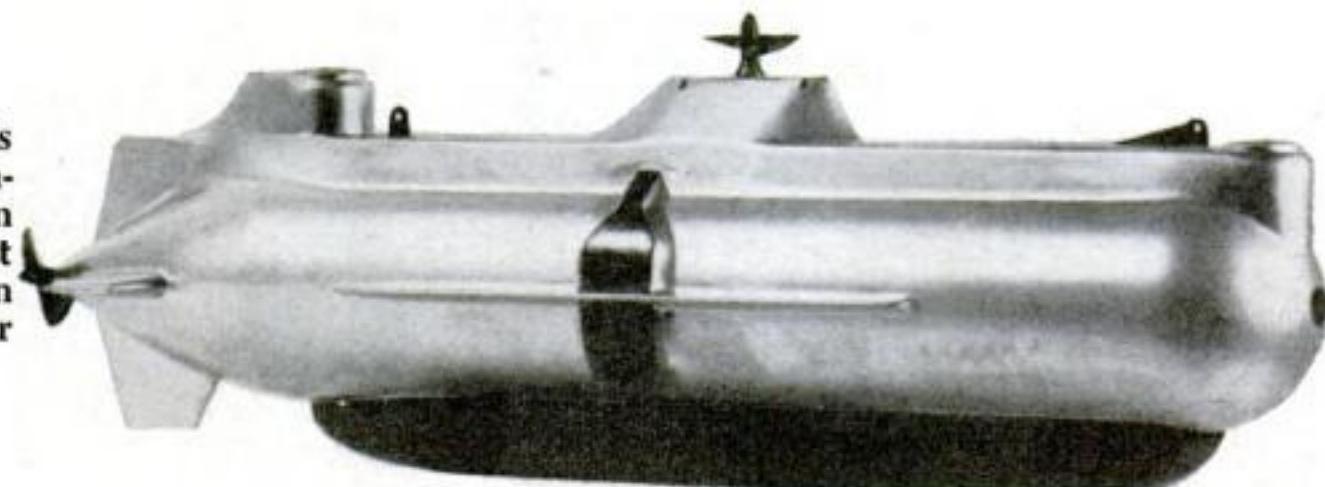
UNDER design for deep-sea exploration, an electric-powered aluminum submarine will carry three observers on 36-hour journeys of 100 miles, at depths of 15,000 to 18,000 feet. To view natural wonders or hunt sunken treasure, it will probe deeper than man's farthest descent to date—a 13,287-foot dive by two French naval officers in a bathyscaphe designed by Prof. Auguste Piccard.

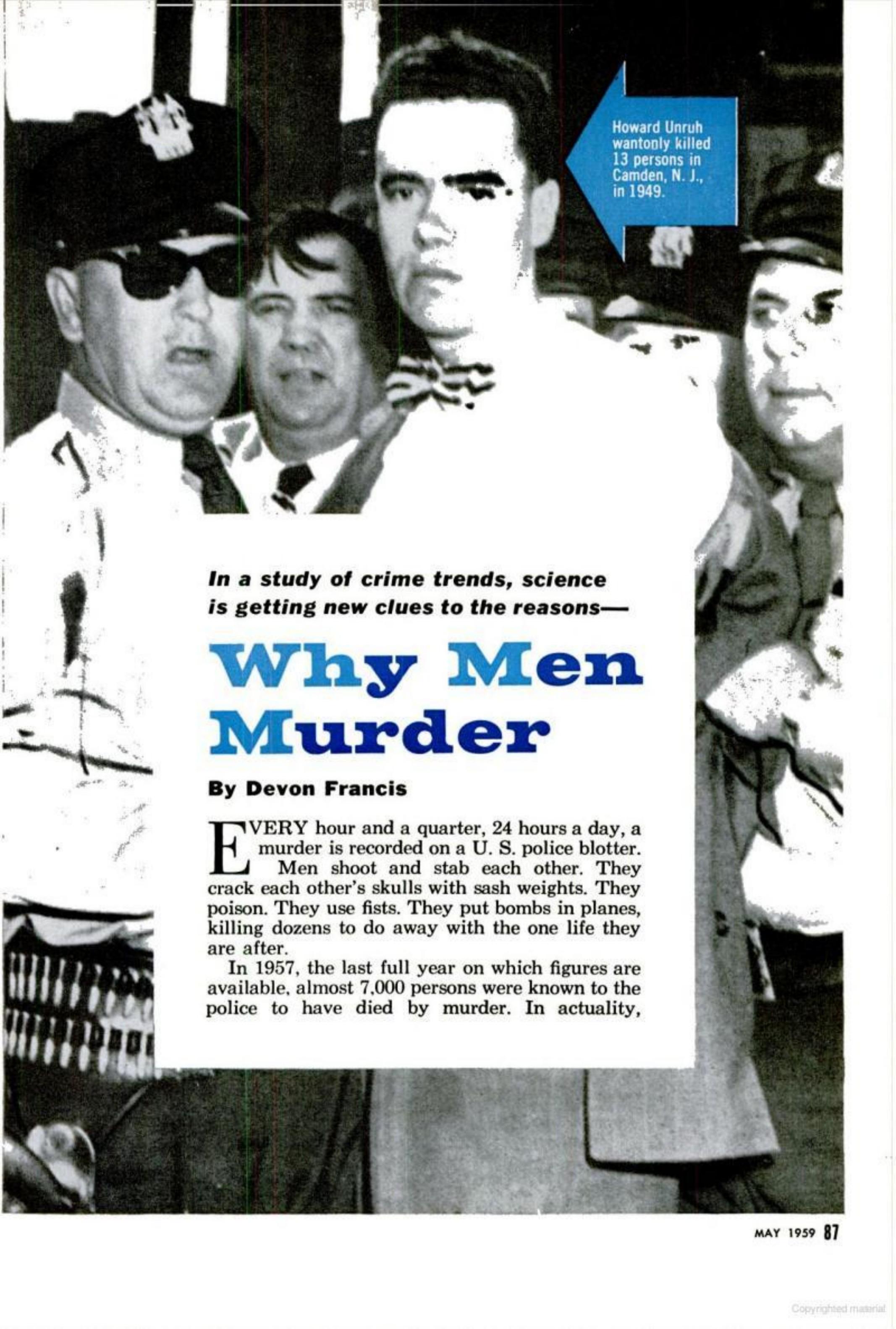
Development of the 48-foot Aluminaut, as the novel submarine has been named, is a private enterprise of the Reynolds Metals Company of Richmond, Va. Already under way, following a study showing its feasibility, are preliminary designing and structural-model tests. Then will come its final designing, its construction, and sea trials in which it will descend more than three miles, unmanned, to prove its safety before scientists entrust their lives to it.

The staggering pressure at the Aluminaut's intended cruising depth—more than three tons to the square inch—would instantly crush a conventional submarine's hull. To withstand it, the cabin will be a cylindrical 30-foot-long "pressure hull" of six-inch-thick aluminum. Its lightness, compared to a steel hull of equal strength, dispenses with buoyant appendages to support its weight. Loading and dropping ballast suffice for descent and ascent.

Outside the pressure hull, an oil-filled stern compartment holds the main propeller's motor. An auxiliary screw atop the craft aids vertical maneuvers. If ballasted just enough to start down, the Aluminaut would naturally stop sinking and hover at a level part way to the bottom, because of the increasing density of the water—more compressible, under pressure, than the hull. For deeper dives, an excess of ballast will be taken aboard.

EXTERIOR VIEW of craft is given by model. Company developing design hopes to have its first submarine of this type in the water and ready for sea trials by 1961.





Howard Unruh
wantonly killed
13 persons in
Camden, N. J.,
in 1949.

*In a study of crime trends, science
is getting new clues to the reasons—*

Why Men Murder

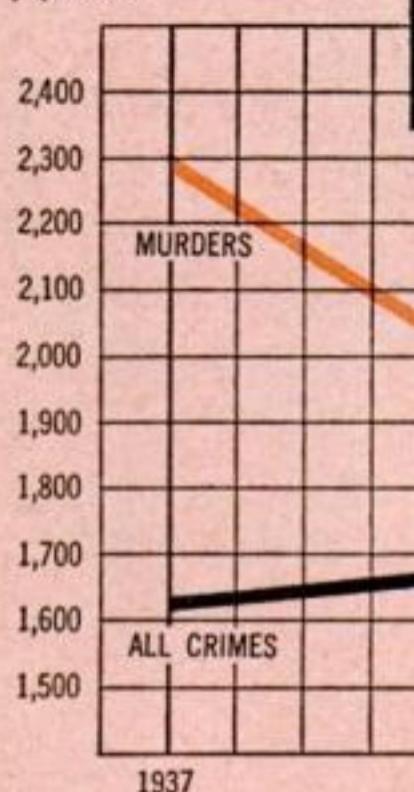
By Devon Francis

EVERY hour and a quarter, 24 hours a day, a murder is recorded on a U. S. police blotter. Men shoot and stab each other. They crack each other's skulls with sash weights. They poison. They use fists. They put bombs in planes, killing dozens to do away with the one life they are after.

In 1957, the last full year on which figures are available, almost 7,000 persons were known to the police to have died by murder. In actuality,

ALL CRIMES

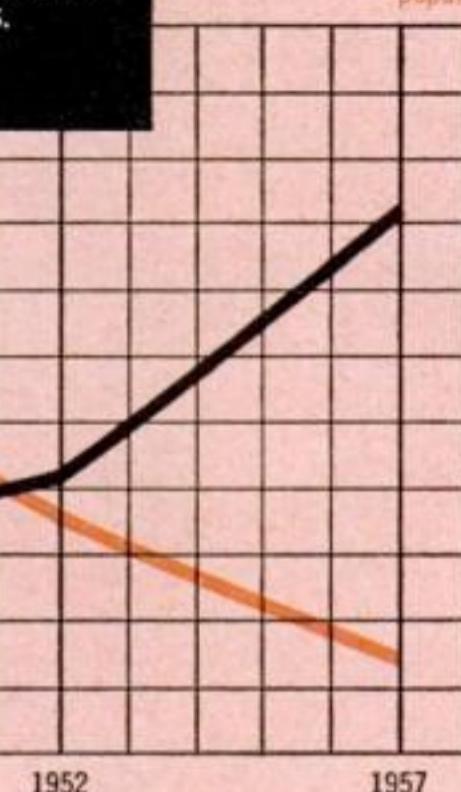
per 100,000 population



While crime is going up faster than the population, murder is decreasing. Shown here are trends for 21 years in 353 U. S. cities of more than 25,000 inhabitants. The figures are corrected for population growth.

MURDERS

per 100,000 population



there were more than that, for the undetected murder—masquerading as death by natural causes or by accident—never becomes a murder statistic.

Yet:

While the total number of major crimes in the country has gone up for at least 20 years and has risen far faster than the growth of population, the rate of murder has been falling almost steadily. Murder, in other words, is one crime that is growing less and less popular.

This is no cause for rejoicing. The United States still holds clear title to being the world's most murdering nation. Our murder rate appears to be almost eight times as high as England's, twice that of Japan, four times that of West Germany, 13 times that of Norway.

Relatively, murder is not a major cause of death. Known murders amount to less than half our known suicides—and claim less than a fifth of the number of lives sacrificed in auto accidents. Statistically, the murderer is only one-ninetieth as big a killer as heart disease.

Why men are willing to put their own lives in jeopardy to extinguish those of others has been puzzled over since Cain slew Abel. The theme of murder is used dozens of times each week by television script writers. It has inspired stacks of heavy tomes. Legal philosophers, sociologists, psychologists, psychiatrists have

theorized endlessly. But the cause of murder still remains a considerable mystery. Students of murder can spot only the ostensible reasons for it—greed, jealousy, fear, revenge, or a sudden insane anger that seizes a person and, a moment later, blots out all memory of his deed.

But some progress has been made, much data collected. Here is what we know of murder, as of the spring of 1959:

Murder is an adult's crime

Despite the headlines, murder is not predominantly committed by crazy juvenile delinquents. In a group of cities with a total population of 40,000,000, persons in the 30-34 age group, in 1957, committed more murders than any others—15 percent of the total. The 25-29 age group was close behind. But murders by kids 18 years old and less were only 8.7 percent.

Women as well as men commit murder, and the bleak statistics leave large areas for free play of the imagination on cause. Divorced men are nearly six times as likely to be murdered as married men. Widowed men are four times as likely to be murdered. Do most such men expire while a woman scorned, brimming with furies worse than hell, stands over them clutching a smoking gun? The statistics do not say.

The FBI's "most wanted" fugitives usually are murderers



DOMINICK SCIALO



GEORGE COLE



DAVID KEEGAN

BY FLEEING ACROSS A STATE LINE, if he's rated dangerous, a man can make J. Edgar Hoover's ever-changing list of prize quarries and get his picture in the post offices. These three are

Murder, though, is predominantly a man's crime. Women killed less than a quarter of those who met death at the hands of others in 1957. On the receiving end, divorced women stand a three-to-one greater chance of being murdered than their married sisters. Single women are the safest.

Murder and the map

A man's chance of being murdered—or of murdering—varies greatly according to geography. Sixteen Southern states, with only 29 percent of the population, had more than 42 percent of the murders. Southern cities have the highest per-capita rate. Macon, Ga., with a 1957 rate of one murder for each 4,542 residents, led all the rest. Columbus, Ohio, was the most murder-free big city, with one murder for each 41,054 people, closely followed by Buffalo and Milwaukee.

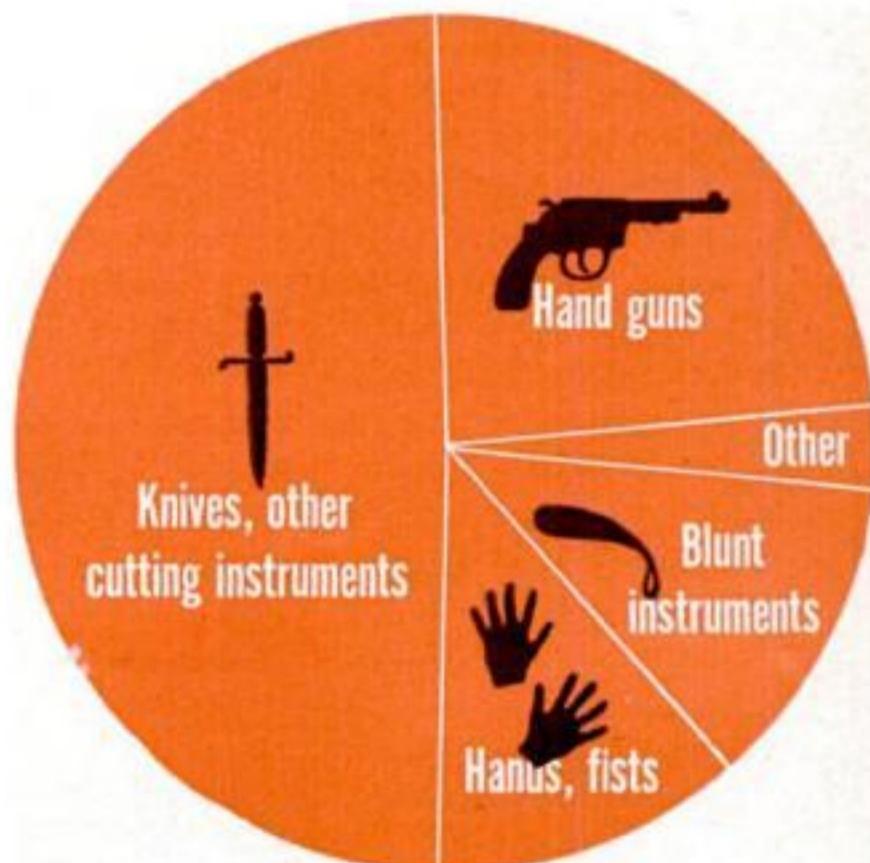
But that was by no means the tops in performance. Among 557 U.S. cities of more than 25,000 population, 189 of them—on the basis of police reports—had no murders at all.

The Federal Bureau of Investigation cautions that there are pitfalls in comparing crime data among cities. It lists many non-comparable environmental factors: climate, size of population and its stability, its composition as to age, sex,

wanted, respectively, in New York, California and Iowa for trial in state courts. In each case a life was snuffed out by gunfire. The slain were a gangster, a policeman and a holdup victim.

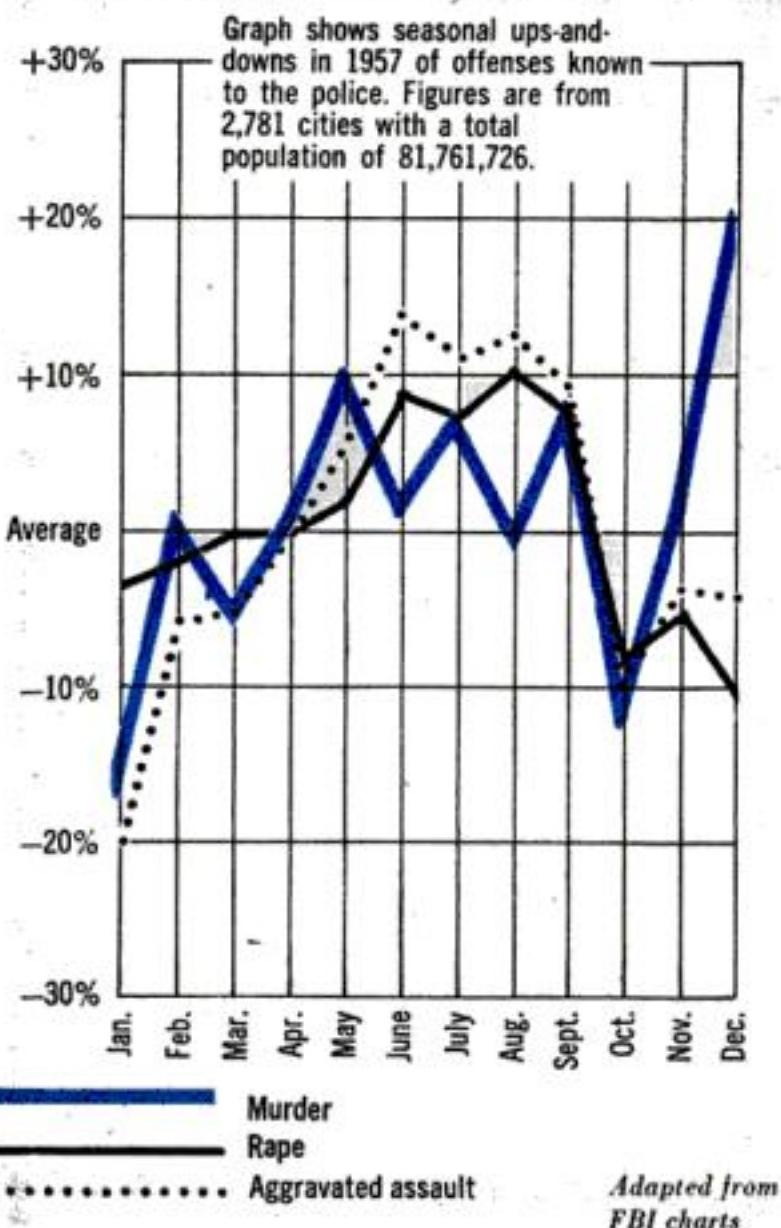
and race; economic status, the size and efficiency of the police force, policies of prosecuting officials and courts, local attitudes toward crime, and the city's facilities for education, recreation and religious worship.

Among the great metropolitan areas, New York had the largest number of murders in 1957. But it could muster evidence that it was a pretty safe place to live: one murder there for each 24,000 residents. The Los Angeles-Long Beach



THE SILENT, LETHAL KNIFE—and its variations—is the favorite weapon of the murderer.

Monthly variations in three major crimes



area, despite TV's Lieut. Friday, had one for each 19,500. In Chicago the rate was one for each 13,000.

Murder and the calendar

During hot weather, as you might expect, more murders are committed. For the 10 years starting with 1948, the frequency of murder climbed in late spring, stayed high in the summer, and dwindled in the fall. But here a strange phenomenon occurs: In five of those 10 years, the single month with the highest incidence of murder was December.

Police explain the warm-weather peaks as resulting from anger induced by discomfort. It's hot, one citizen offends another with a hair-trigger temper, and a gunshot settles the issue. Opportunity is also a factor: The woodsy, isolated areas frequented by those escaping the heat are convenient murder locales.

As for the December peak, the cops also have some theories—though these can't, in the nature of things, be readily tested. For one thing, the winter solstice is near, days are short, and darkness en-

courages the crime of ultimate secrecy. There is more drinking during the holidays, and this can lead to arguments culminating in murder. Finally, people are walking around with money in their pockets for Christmas presents, and murder may be a by-product of the sharp increase in robbery then.

How they do it

Police records indicate that murder weapons change little from year to year. An exotic weapon gains publicity because of its very rarity; the booby-trapped auto or the bomb-laden suitcase are sure of headlines. An imaginative dentist became notorious when he filled a victim's cavity with slow-acting poison.

But by far the largest number of murders are committed with four "standard" weapons: hand guns, cutting instruments, blunt instruments, and—surprisingly—bare hands. Hand guns are, of course, commonly revolvers or automatics; cutting instruments range from razors to switchblade knives and cleavers. The blunt instrument is a tire iron, bat, poker.

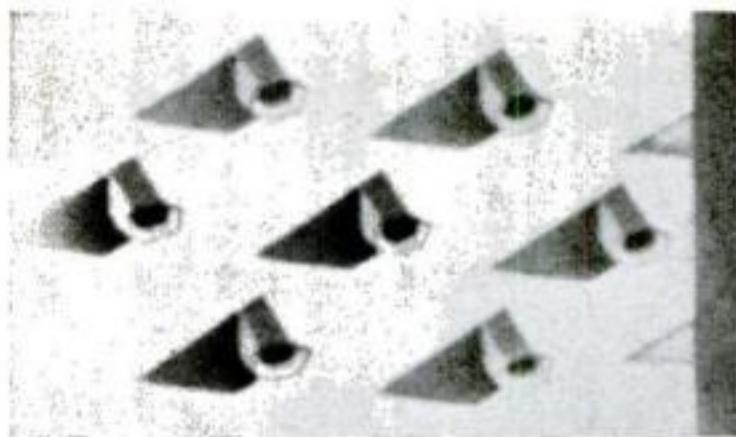
Because of its admixture of races and cultures, and its extremes of wealth, New York City supplies a rich sample of modes in murder. A study of 320 murders in 1958 showed that about half the killers used knives or other cutting instruments. They used hand guns only half as often and blunt instruments only a fourth as often. They killed with their bare hands only one time in eight. Far down the list were rifles, shotguns, poisons, and the automobile.

A persistent murderer seldom changes his modus operandi. An English killer got caught after his sixth slaying only because he extinguished each of his victims in the same way—by strangling. He was in a rut.

Why they do it

The reasons for murder given in the courtroom are probably seldom the real ones. The police, the prosecutor, even the court, elicit only the apparent causes. The murderer himself is the last person to ask for a motive. He wants only to save his neck, if necessary by distorting the truth.

[Continued on page 252]



WIND CATCHER.

Air conditioning for this new 75-room hotel at

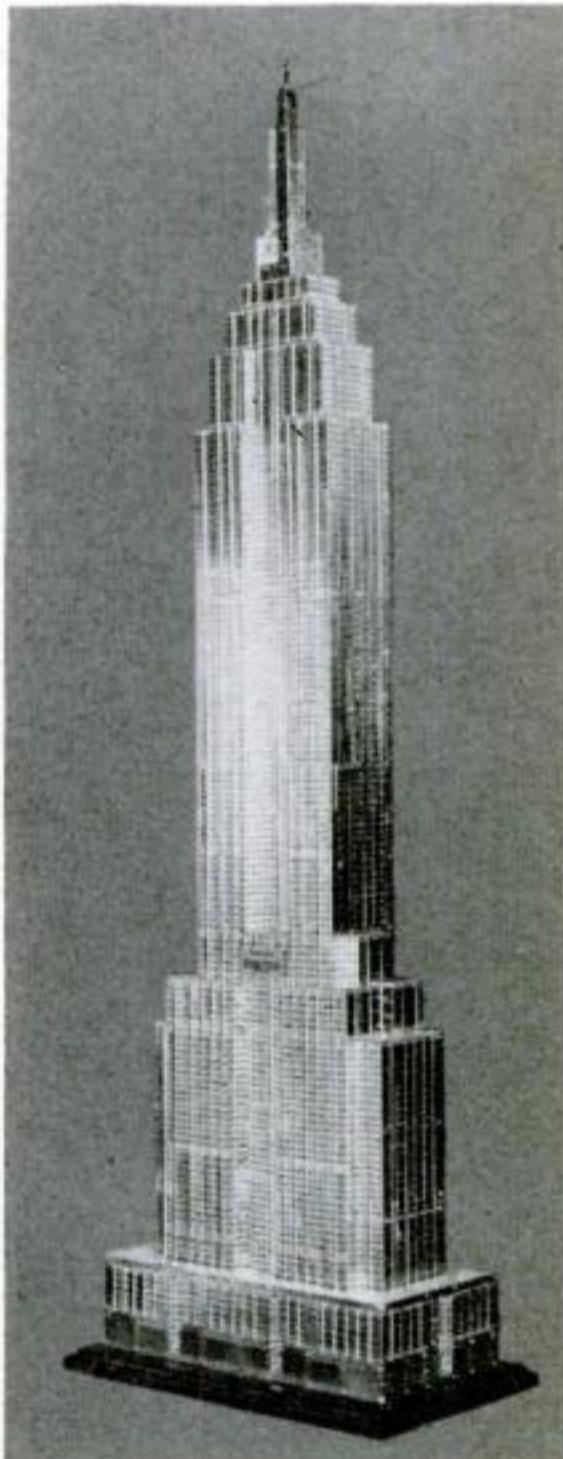
Mombasa, Kenya, four degrees south of the equator, is provided by nature. Ducts (left) in panels between windows (right)



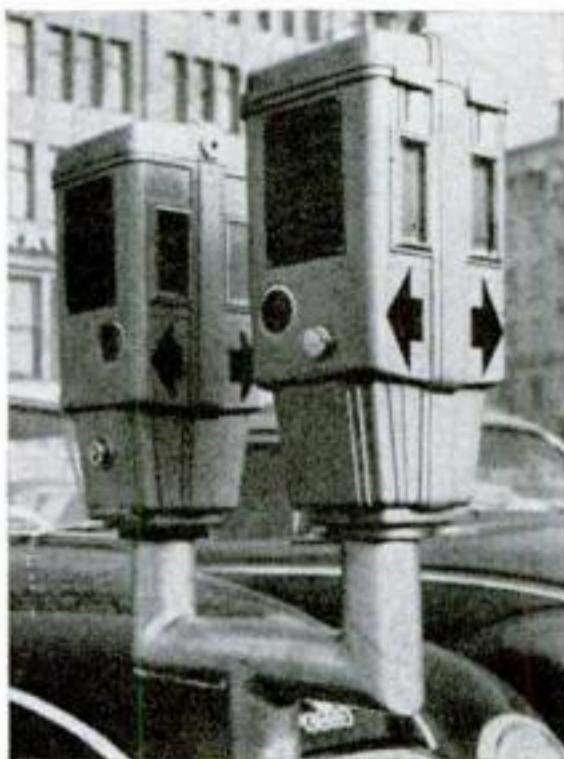
admit and circulate the breeze from the constant Indian Ocean trade winds. The hotel is perched on an island cliff overlooking the entrance to the harbor for this modern city on Africa's east coast.



ALL-WEATHER POOL. An air-supported roof makes this heated public swimming pool at Ashland, Ore., popular all year round. The 50-by-125-foot plastic covering is reinforced by nylon fibers. It was made by G. T. Schjeldahl Co., of Northfield, Minn.



MULTI-METER. A money saver as well as a money collector, these parking meters in downtown Hamburg, Germany, do quadruple duty. The twin meters are installed in pairs back to back on single stanchions at intervals along a center line on wide streets. Four cars may be parked—one at each corner of the stanchion—for the equivalent of 10 cents per car for a two-hour period.



BOY'S DREAM. This nine-foot model of the Empire State Building, displayed in the lobby of the original by A. C. Gilbert Co., is made of Erector set parts. It took a total of 690 girders, 1,500 nuts and bolts, 83 man-hours.

Big Changes Coming in Auto Electric Systems

New cures for electrical troubles? On the way, with transistors and AC generators

By Hubert Luckett

CHANCES are that the last auto-repair bill you paid was for work on your car's electrical system. Many drivers of recent cars are resigned to buying frequent ignition tuneups to keep their engines running right. Garage operators report that the most frequent calls for emergency service (aside from out-of-gas) are for electrical troubles.

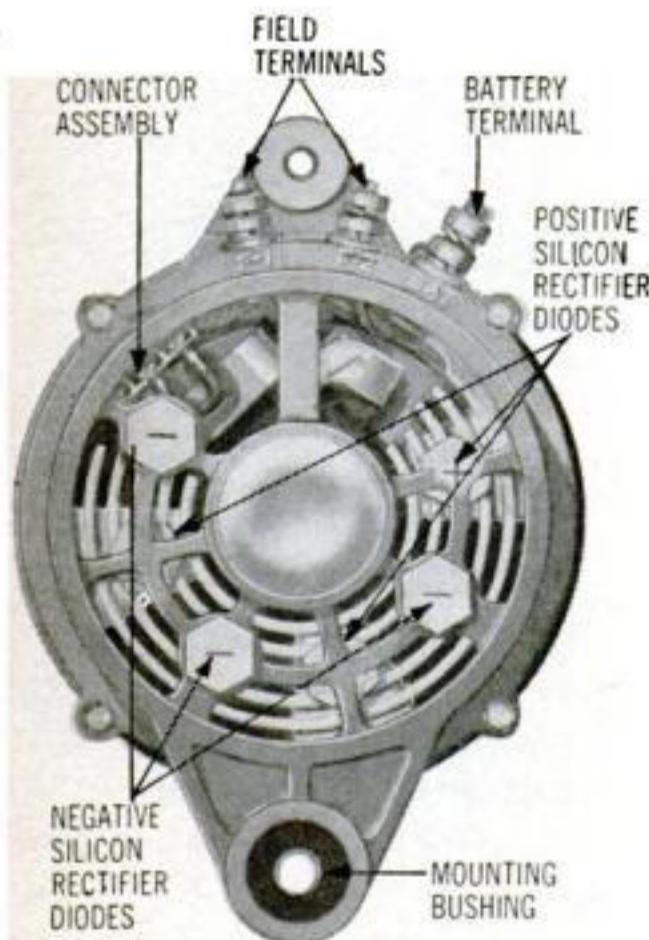
But things are going to get better. Research that started in the telephone field—of all places—has given the auto engineers hardware that promises to whip

these problems. It all started with Bell Labs' work with semiconductors.

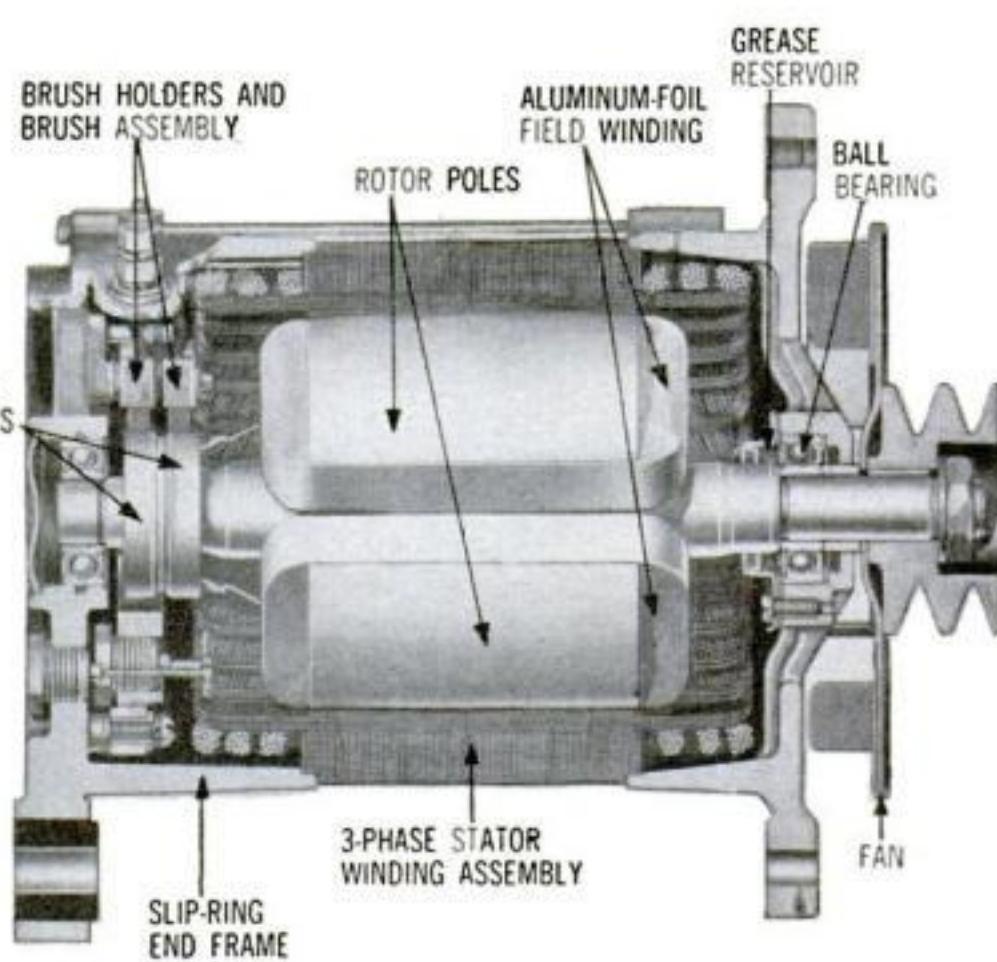
You'll soon be seeing revolutionary changes rather than evolutionary ones. AC generators and transistor regulators—available now as extra-cost equipment—will replace the present units. In the offing are several new kinds of ignition systems, including dramatic new replacements for the ancient spark plug.

The margin of reserve power in the crucial parts of your car's electric system has been shrinking. This has come in spite of steady improvements:

- Maximum output of conventional generators is up from 85 watts in 1925 to over 600 watts on some cars this year.
- Battery capacity has more than tripled with little increase in package size.
- Spark voltage available is up to

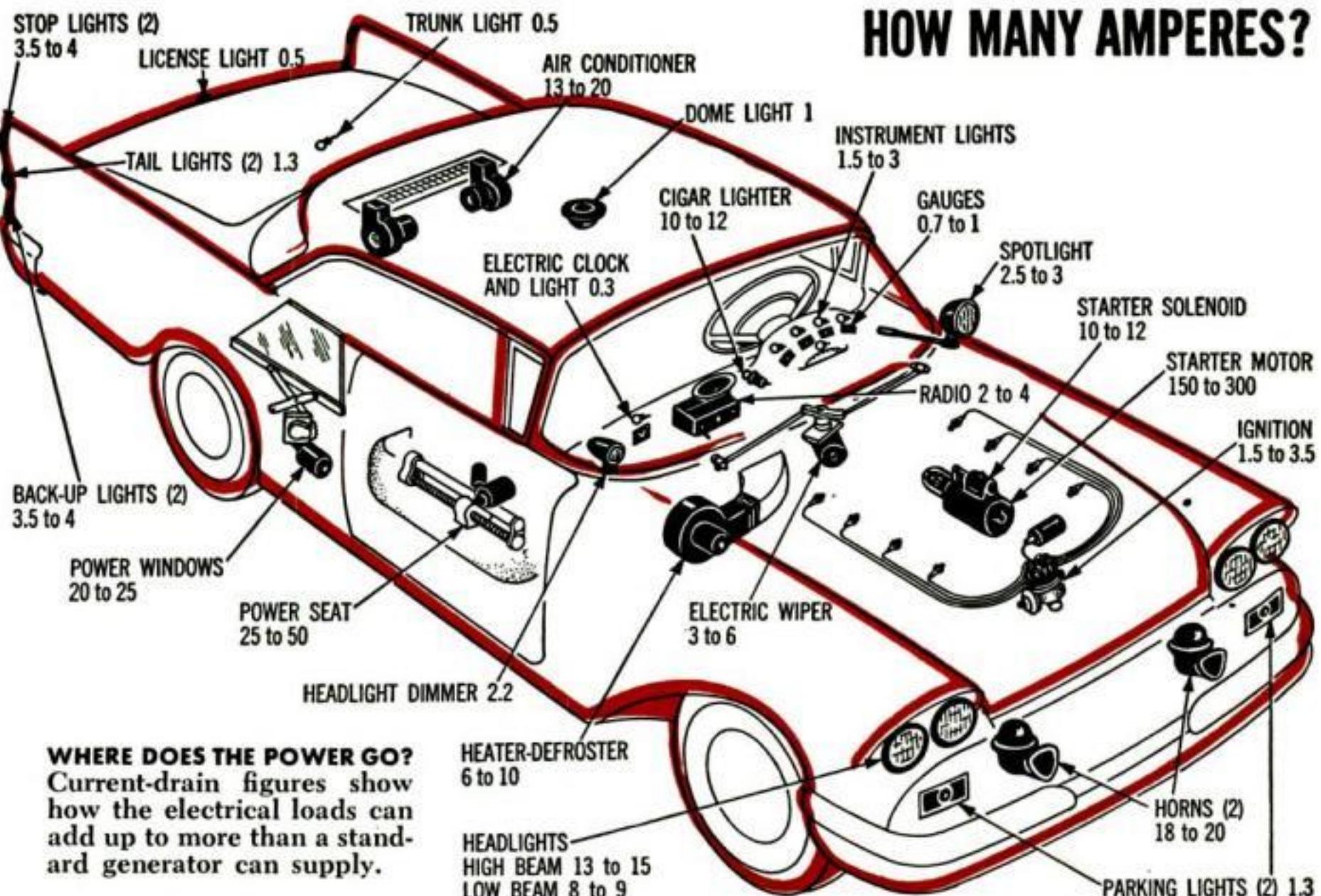


NEW AC GENERATOR FOR PASSENGER CARS delivers 26 amperes at idle—60 amperes, maximum. Six silicon rectifiers built into the end



frame convert the output of the three-phase generator to DC. Brushes ride on smooth slip rings to supply current to the rotating field.

HOW MANY AMPERES?



about 25,000 volts (at 50 m.p.h.) compared with 12,000 volts in 1925.

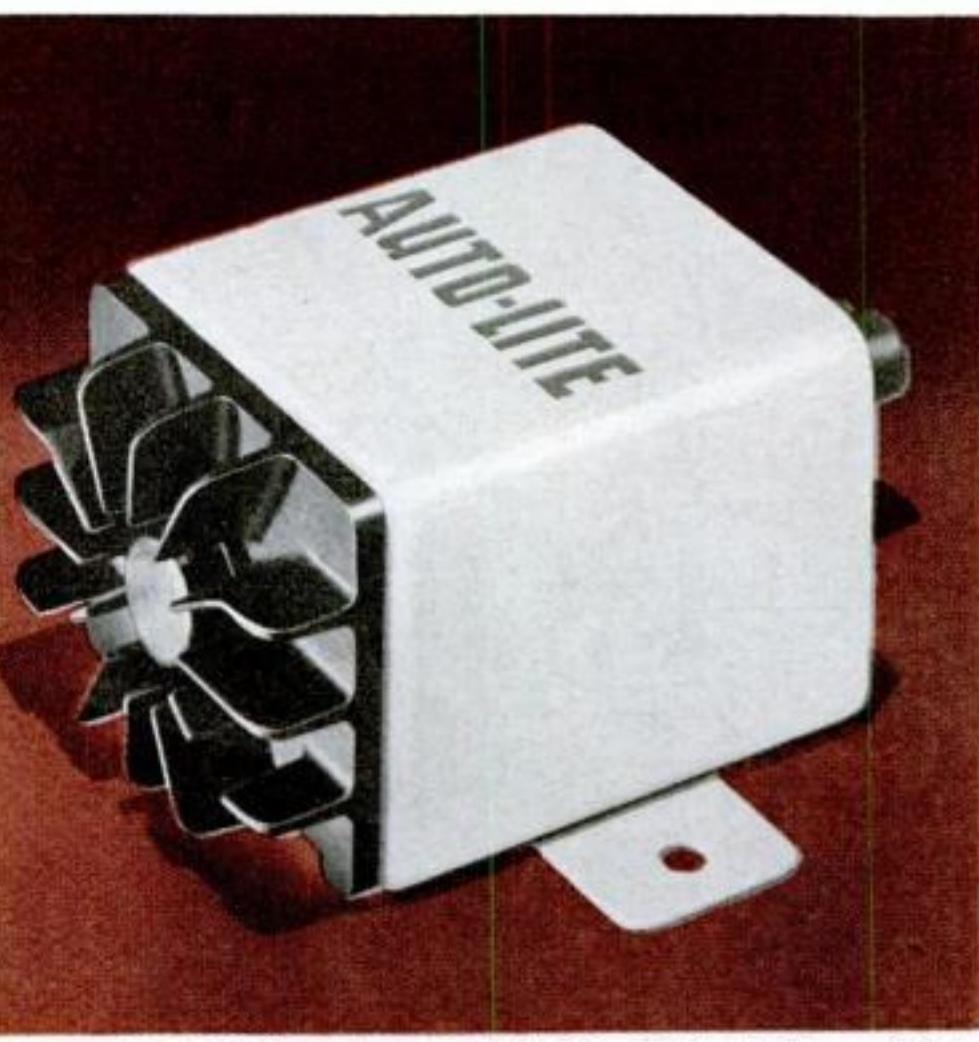
These have resulted from modifying a system that, fundamentally, has not changed since Boss Kettering put elec-

tric starters on the 1912 Cadillac. Engineers have found it increasingly difficult to meet the rising needs of each new model, within the limitations of the traditional system. As a result they have had to nibble away at that margin of reserve that would allow a comfortable leeway for moderately careless maintenance, or unusual car use. Here's the situation:

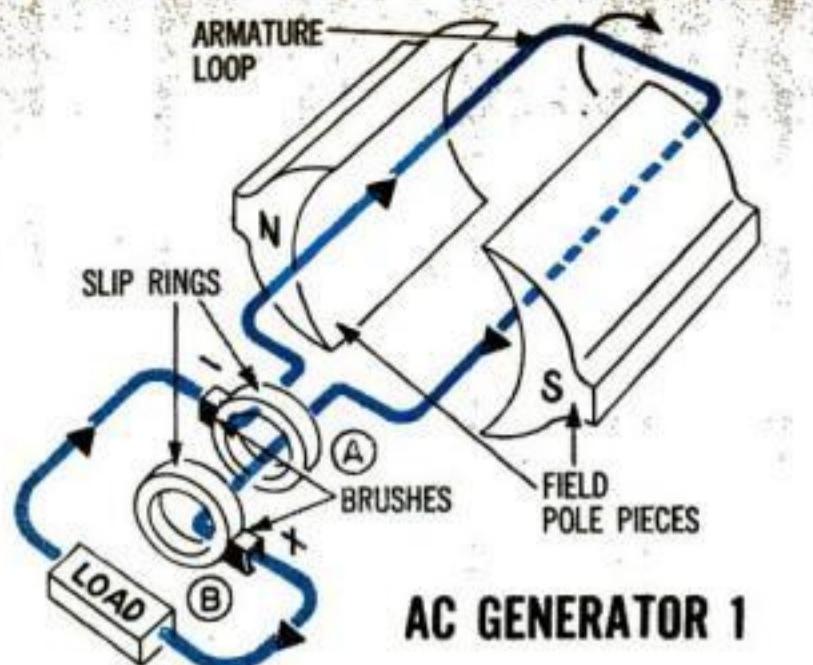
- Standard generators cannot carry a typical load in slow traffic—where you do more and more of your driving.
- Cars are loaded with power-hungry accessories that drain current even when idling in traffic—and more are coming.
- Batteries must make up the deficit for long stretches and still be able to start the bigger engines. Even if subsequent fast driving recharges a battery, such "deep cycling" drastically shortens its life.
- Ignition systems have to work much harder on high-compression engines, and the small margin of reserve means frequent tuneups to keep one running right.

Why AC? So far, no one has found a better way to package enough power to crank the engine than the storage battery. So you still need DC to charge the battery. Why switch to AC generators?

The power you can get from a given

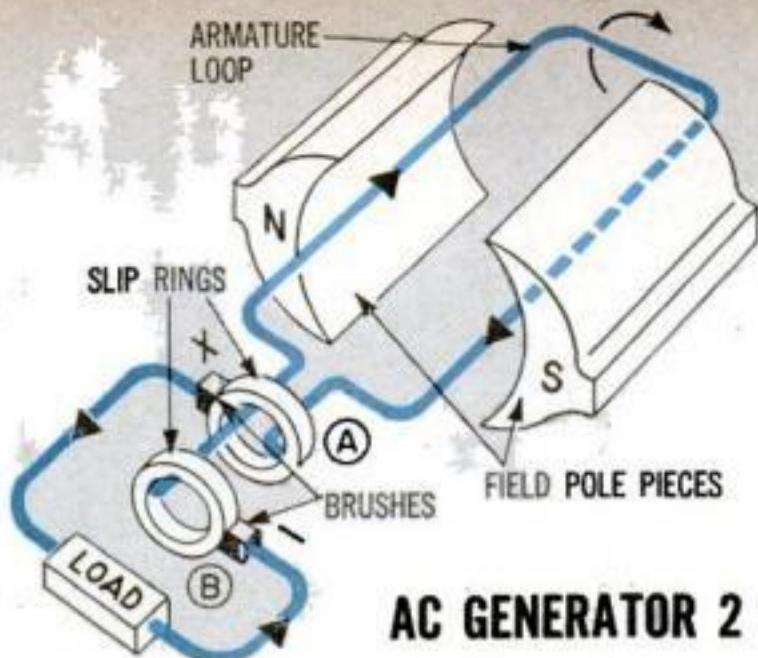


TRANSISTORIZED IGNITION COIL delivers high spark voltage at all engine speeds, and ends major causes for breaker-point replacement.



AC GENERATOR 1

A LOOP OF WIRE rotating in a magnetic field shows the principle of a simple generator. Direction of current flow depends on direction the wire moves across the magnetic field. In the first diagram, the left side of the loop moves up across the field causing current to flow away



AC GENERATOR 2

from brush "A"; the right side moves down across the field causing current to flow toward brush "B." As the loop turns, the side formerly moving up now moves down, and the polarity of the voltage delivered to the brushes is reversed. The output is alternating current.

size of DC generator is limited by the amount of current that will pass through the sliding contact of the brushes without excessive sparking. Commutation is the snag. But a DC generator is essentially an AC generator with the commutator and brush rigging acting as a rotary rectifier. You can skirt the problem by generating AC and using a separate static rectifier to get the required DC.

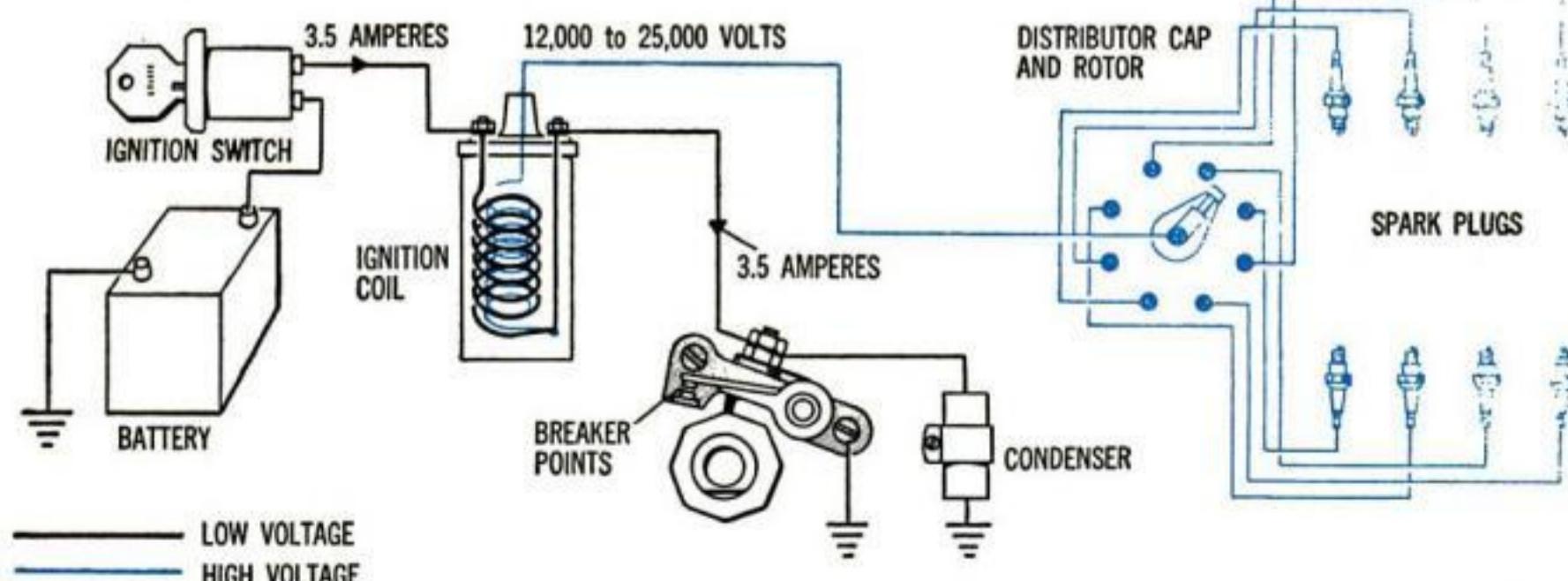
There are a couple of added benefits from this arrangement: 1) The AC generator can be a three-phase machine which gives 1.5 times as much power for the same amount of active materials. 2) You can turn the generator inside-out so that the heavy currents are generated in the stationary windings. This is a rotating-field generator. Now the only current

passing through sliding contacts is the small current needed to make the rotor an electromagnet.

What are we waiting for? The biggest stumbling block has been the lack of a suitable rectifier. Selenium rectifiers are used in the AC systems that have been available in limited numbers. But they are bulky, expensive and can't take high temperatures. And selenium is relatively scarce.

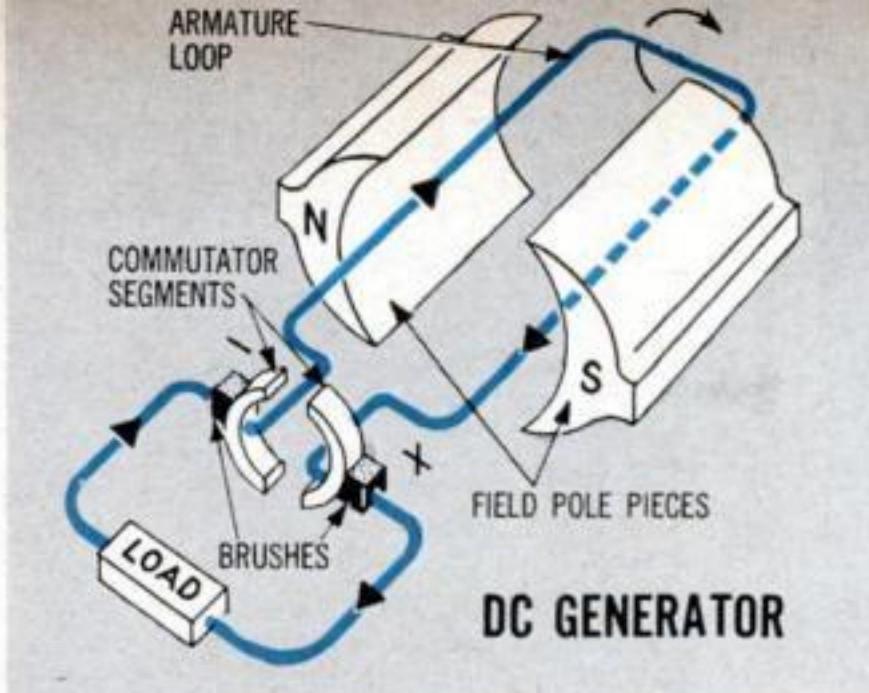
Research in semiconductors, sparked by the fantastic success of transistors, has produced the silicon diode rectifier. It is extremely compact, withstands high temperatures, will handle heavy currents, and is made of one of the world's most plentiful materials. Although the present price is high, experts are sure the cost

CONVENTIONAL SYSTEM



HIGH-VOLTAGE ENERGY available for spark is limited by the amount of primary current a car's breaker points can interrupt successfully; and

by the fact that, at high r.p.m., the points cannot remain closed long enough for maximum energy to build up in the ignition coil.



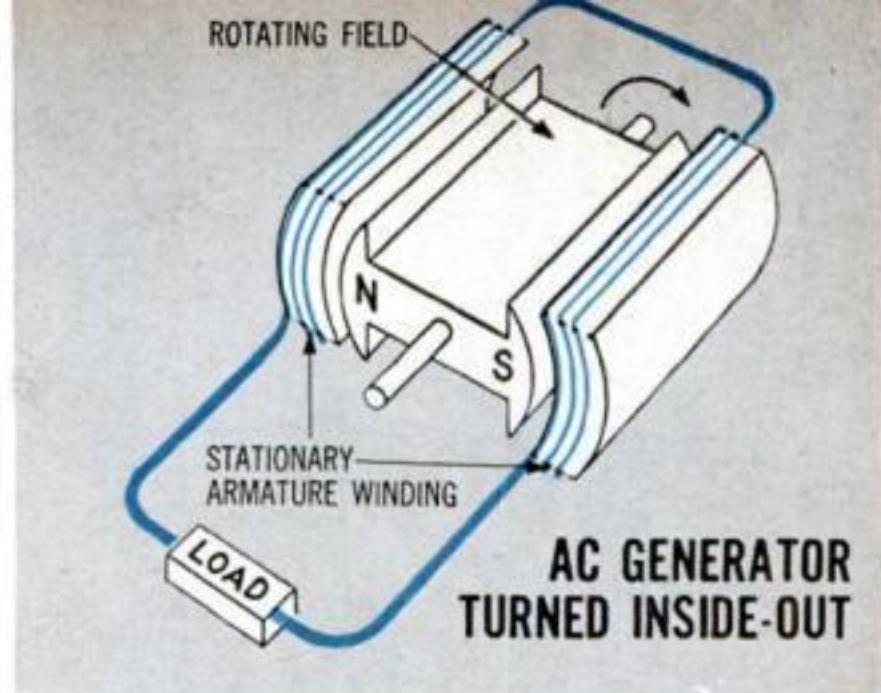
COMMUTATOR IN A DC GENERATOR automatically switches the connections to the loop so that each brush always has the same polarity. But high currents will arc when interrupted, so generator output is limited to values that will not destroy the brushes by excessive arcing.

can be drastically reduced with quantity production.

You can get them now. Delco-Remy recently brought out an AC generator specifically designed for passenger cars. It has silicon rectifiers built in the generator housing. It is only $5\frac{3}{4}$ inches in diameter and fits the same mounting as the standard 12-volt, 30-ampere generator. Its maximum output is 60 amps and it will deliver 26 amps at idle. Although it is available now only as an after-market accessory, insiders are betting it will show up on some production cars within the next year or two.

One of the most troublesome items on a car is eliminated by a companion unit, an all-electronic regulator using transistors.

Ford has already announced that sim-



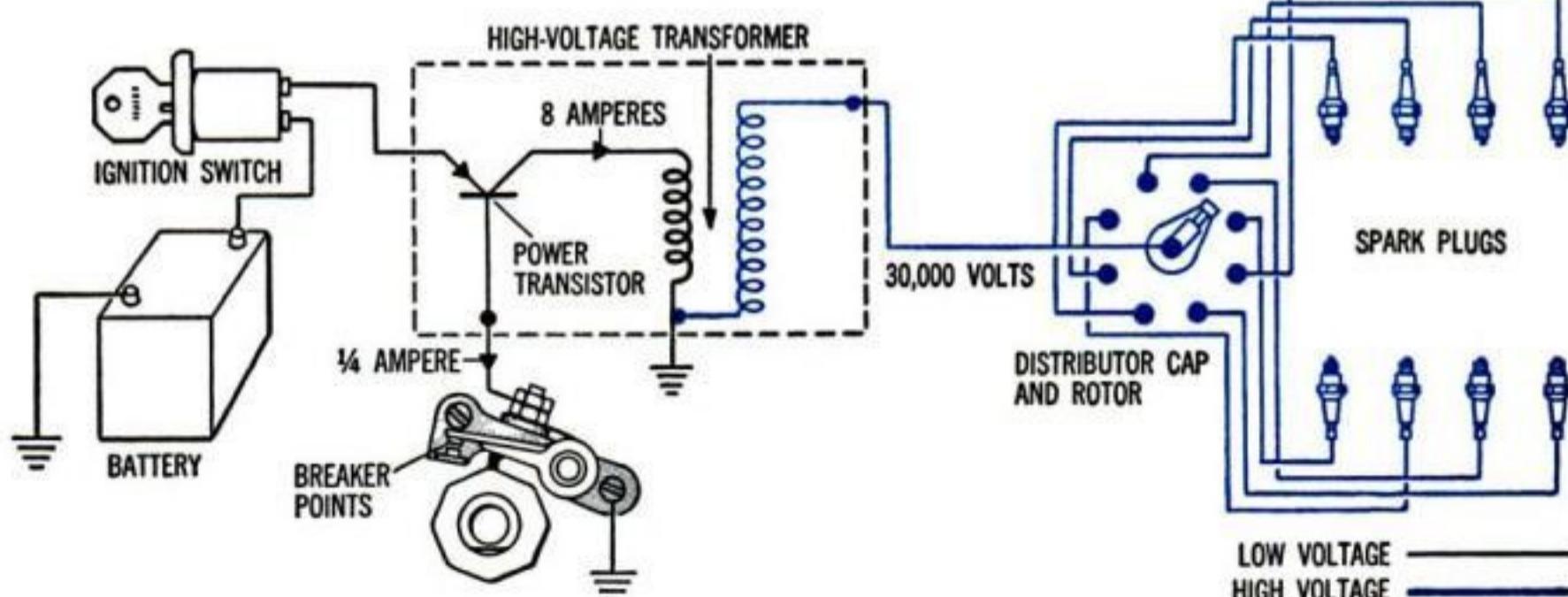
COILS IN WHICH THE CURRENT IS INDUCED can be stationary while the magnetic field moves. The big advantage is that the generated power does not have to pass through sliding contacts. Because commutation is not practical, this scheme can be used only for AC generators.

ilar equipment, built by Leece-Neville Company, will be standard on several lines of trucks.

How you benefit. Not every car owner will need the extra capacity of the alternator systems, but if your electrical requirements are severe, if you have to recharge or replace your battery frequently, here's what this new system can do for you:

- It will deliver enough electricity at idle to operate all the accessories on most cars with no help from the battery.
- Battery life is prolonged. With the battery always fully charged, "deep cycling" is eliminated. Experts say that this is the principal reason why batteries wear out.
- With the transistor regulator, this

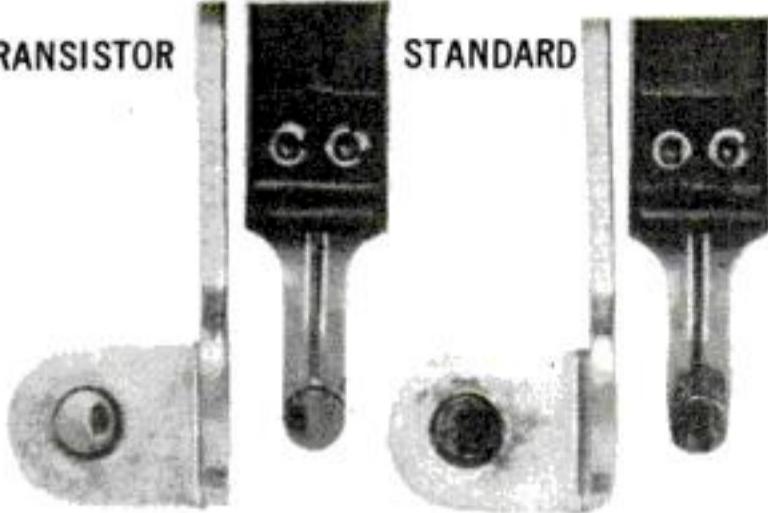
TRANSISTORIZED SYSTEM



A POWER TRANSISTOR easily interrupts up to three times the usual primary current. The mechanical contacts only trigger the transistor.

This permits the design of an ignition coil that speeds energy buildup to give uniformly higher spark voltage at all engine speeds.

TRANSISTOR



44,000-MILE ENDURANCE TEST, carried far beyond useful life of points in standard system, shows effect on transistor-system points: They have only a slight surface discoloration.

source of service trouble is practically eliminated.

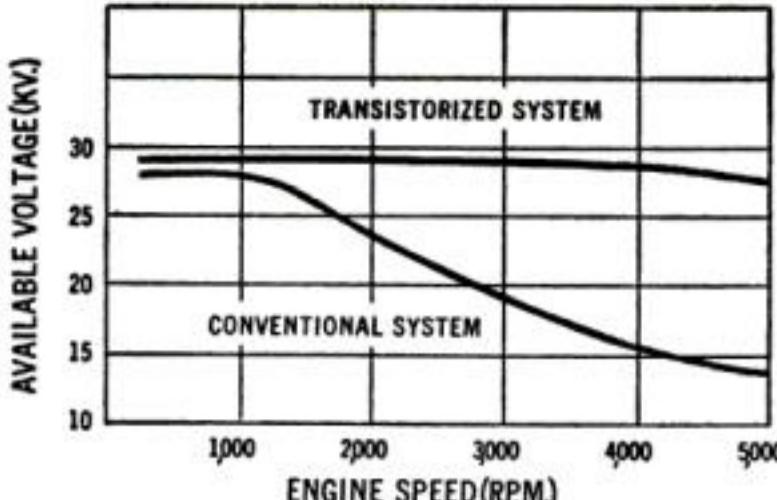
- System voltage can be regulated at lower maximum voltage and still keep the battery charged. This means longer life for your lights, radio tubes and other voltage-sensitive parts.

- It's predicted that no service on the alternator will be required for the average first-owner life of the car. The unit has an estimated life of 100,000 to 300,000 miles.

Do you run out of spark? The standard battery-ignition system has dominated the industry for over 30 years because it is simple, reliable and inexpensive. When more spark-energy output was needed, you simply put more energy into the system—when you have a bigger nail to drive, you get a bigger hammer. But, just as you finally reach a limit in the size of hammer you can handle, the simple battery-ignition system has just about reached the limit of the input power it can handle.

The breaker points are the bottleneck. They interrupt the current in the primary of the ignition coil some 12,000 times for every mile you drive. As the contacts separate, all the current tends to squeeze through the last microscopic area of contact and you get current densities in excess of a million amperes per square inch. This generates enough heat to melt the tungsten (6,100 degrees Fahrenheit).

Pull apart a melted cheese sandwich, and you have a fairly good idea of what happens as the contact surfaces separate. Engineers call it "bridging." Some of the metal is pulled out of one surface, actually prolonging the electrical current beyond the point where it should be interrupted. At the final break, some of the



CONVENTIONAL VS. TRANSISTOR: Graph shows high voltage output of new transistor system, across full range of engine speed, compared with that of a conventional system in peak condition.

metal vaporizes and some is deposited on the other contact surface. Even after the contacts separate, current tends to keep flowing across the air space and you may get some arcing that adds to the electrical erosion of the contacts. Not only are the contacts destroyed when this cycle is repeated often enough, but the erratic nature of the bridging and arcing causes slight inaccuracies in the timing of the spark. These timing inaccuracies contribute to engine roughness.

Blue points. There is another exasperating effect that happens sometimes in cold weather. At low temperatures the resistance in the primary circuit is lower, and the starter turns the engine more slowly. Lower resistance means a heavier current in the coil, and slower operation of the breaker points causes them to carry this current for a longer time. The entire contact button gets hot enough for the surface of the tungsten to oxidize, forming an insulating coat of blue tungsten oxide. When this happens, your car won't start.

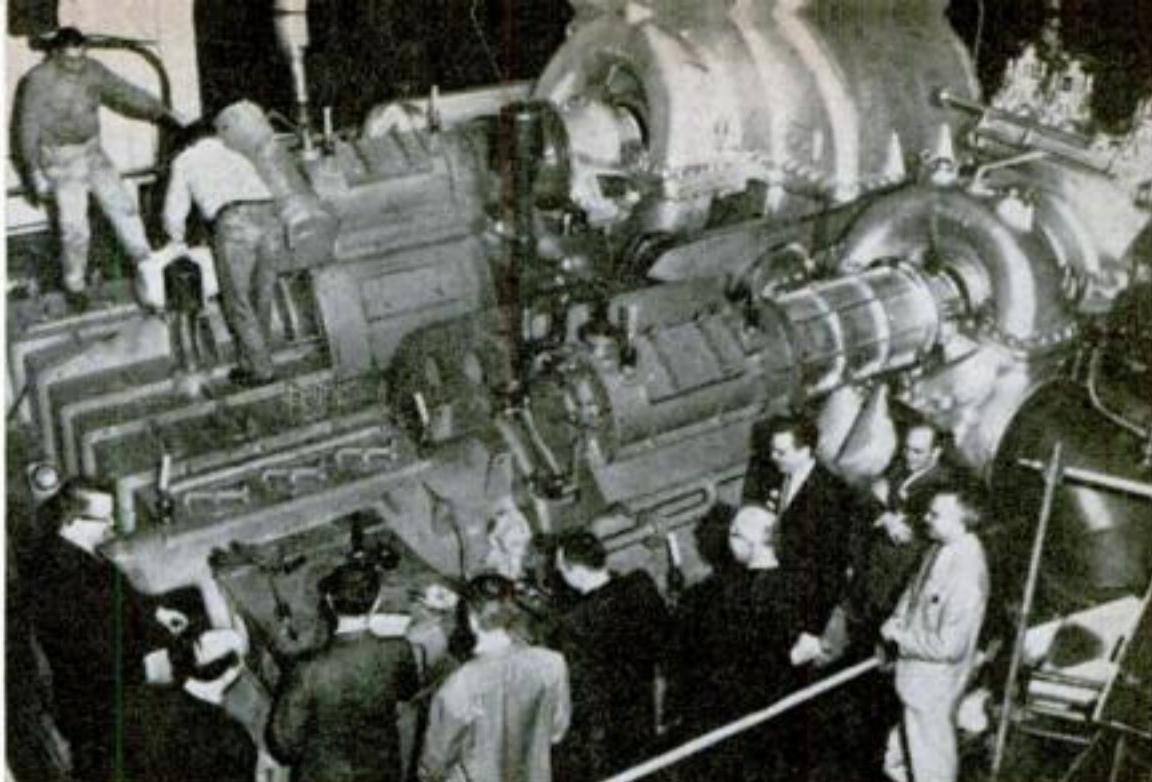
Dilemma. All of these troubles—melting, bridging, arcing and bluing—get worse as the primary current is increased. But with conventional systems, there are only two ways you can get more energy into the system to take care of increasing spark voltage output requirements: either increase the primary *current* or increase the primary *voltage*.

The voltage is fixed by your car's battery voltage, and, as you can readily guess from the above, any further increase in current would probably mean installing new points every time you filled your gas tank.

The switch to 12-volt batteries eased the problem for a while. But there are

[Continued on page 262]

ATOMIC DRIVE. The big steam turbine at right gets its first operating test at the De Laval Steam Turbine Co. plant in Trenton, N.J., before shipment to Camden for installation in the Savannah, the world's first nuclear cargo ship. Steam for its operation will be supplied, at 473 pounds per square inch, by a pressurized-water reactor to drive two generators.



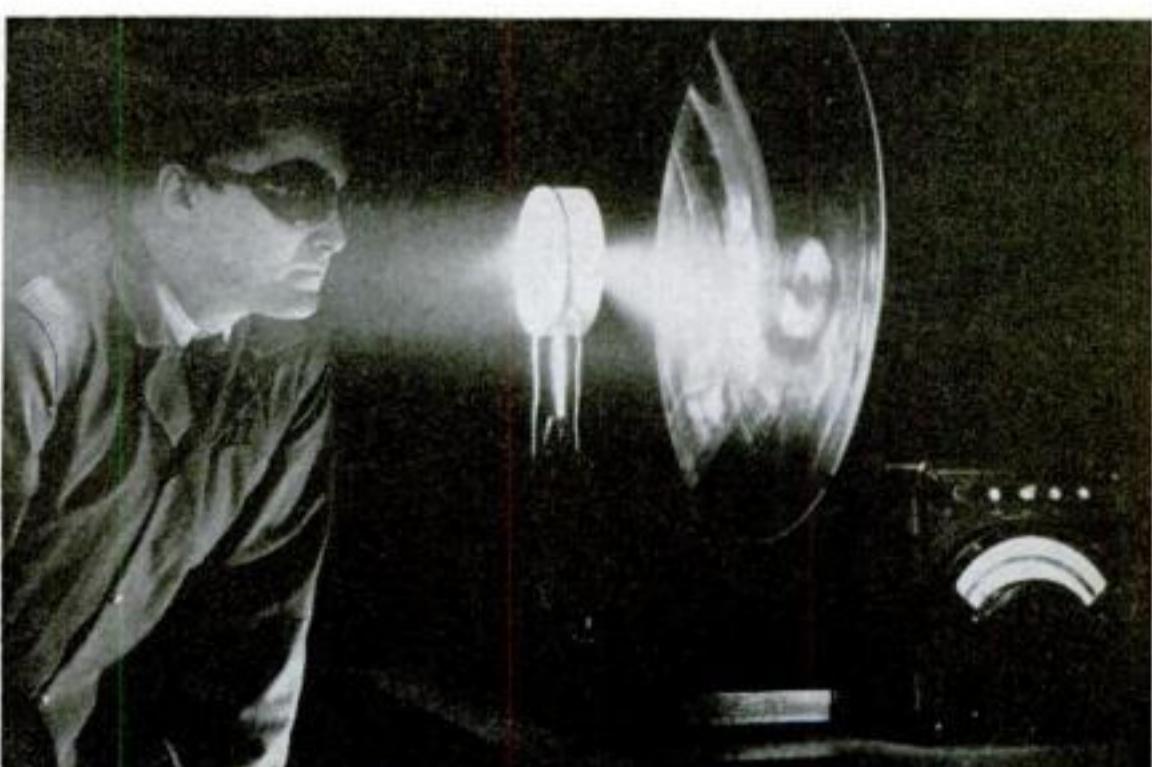
FOUR FRONT WHEELS. Dual wheels let the front axle of this truck carry bigger loads, increase tire mileage. Truck Equipment Co., Denver, makes it.



TIGHT SQUEEZE. The big transformer above barely squeaks through the narrow streets of Hohlfeld, Germany. But slung between two trailers, it made it.

SUN ELECTRICITY. Rays from the sun are focused by the large concave mirror at right on a special assembly of thermoelectric materials that convert the intense heat directly into electricity.

This Westinghouse experimental research apparatus was designed for study of the feasibility of generating solar-thermoelectric power. Future space vehicles may get their electricity this way.



Man's Fastest Rides on Land, Sea and Air

Through the ages, man has propelled himself ever faster and faster. These pages review his progress and give you a look ahead

How man's speed has improved over the passing years

on land...



- 1784** Stagecoach travel, New York to Boston—average seven m.p.h.
1934 Union Pacific Railway, Dix to Potter, Neb.—nine miles, 120 m.p.h.
1957 Sam Hanks, auto-racing pro, at the Indianapolis Speedway—135.6 m.p.h.

on sea...



- 1492** Atlantic crossing, Columbus and his three sailing ships—70 days
1833 The Royal William, powered by steam, cut the crossing time to 25 days
1952 SS United States scored a modern record—three days, 10 hours, 40 minutes

in the air...



- 1903** Wright Brothers' first flight at Kitty Hawk—120 feet in 12 seconds
1927 Lindbergh's solo Atlantic crossing, New York to Paris—33.5 hours
1958 Boeing 707, first jet service, New York-Paris—eight hours, 20 minutes

FOR the first 100,000 years or so, man was satisfied to plod along at a footsore four m.p.h. In a hurry, he could hoist himself aboard a half-wild horse and do up to 30 m.p.h., risking his neck, or he could throw his arms around a floating log and paddle furiously.

Along about 4,000 B.C., the age of speed was launched. Someone lashed two round wooden disks to an axle, and man dashed off in oxcarts and chariots. Someone else hung up a piece of cloth on his barge and sailed away to trade and pillage in distant lands.

That was enough transportation progress to hold man for quite a while. Then, in the 17th century, along came a Hollander who put wheels on his sailboat, creating an amphibian, but it didn't work very well.

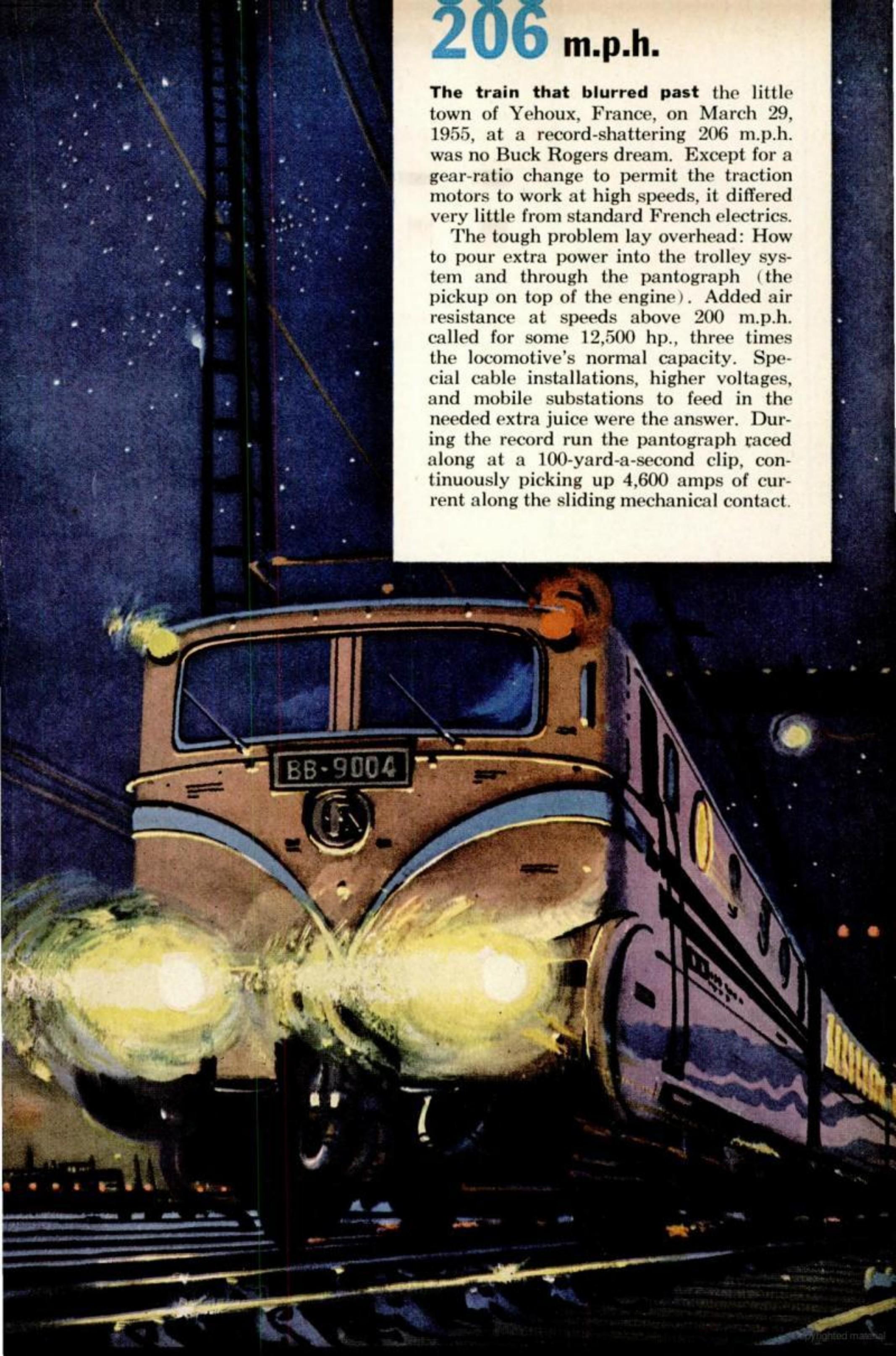
The invention of the steam engine followed, not particularly world-shaking until early in the 19th century when a rash of inventors came up simultaneously with ideas for self-propelled, steam-powered vehicles.

The really important dates are 1823, when the first internal-combustion engine was operated successfully, and 1825, when the first steam locomotive puffed into history. That was the beginning of man's breathtaking race into the future.

206 m.p.h.

The train that blurred past the little town of Yehoux, France, on March 29, 1955, at a record-shattering 206 m.p.h. was no Buck Rogers dream. Except for a gear-ratio change to permit the traction motors to work at high speeds, it differed very little from standard French electrics.

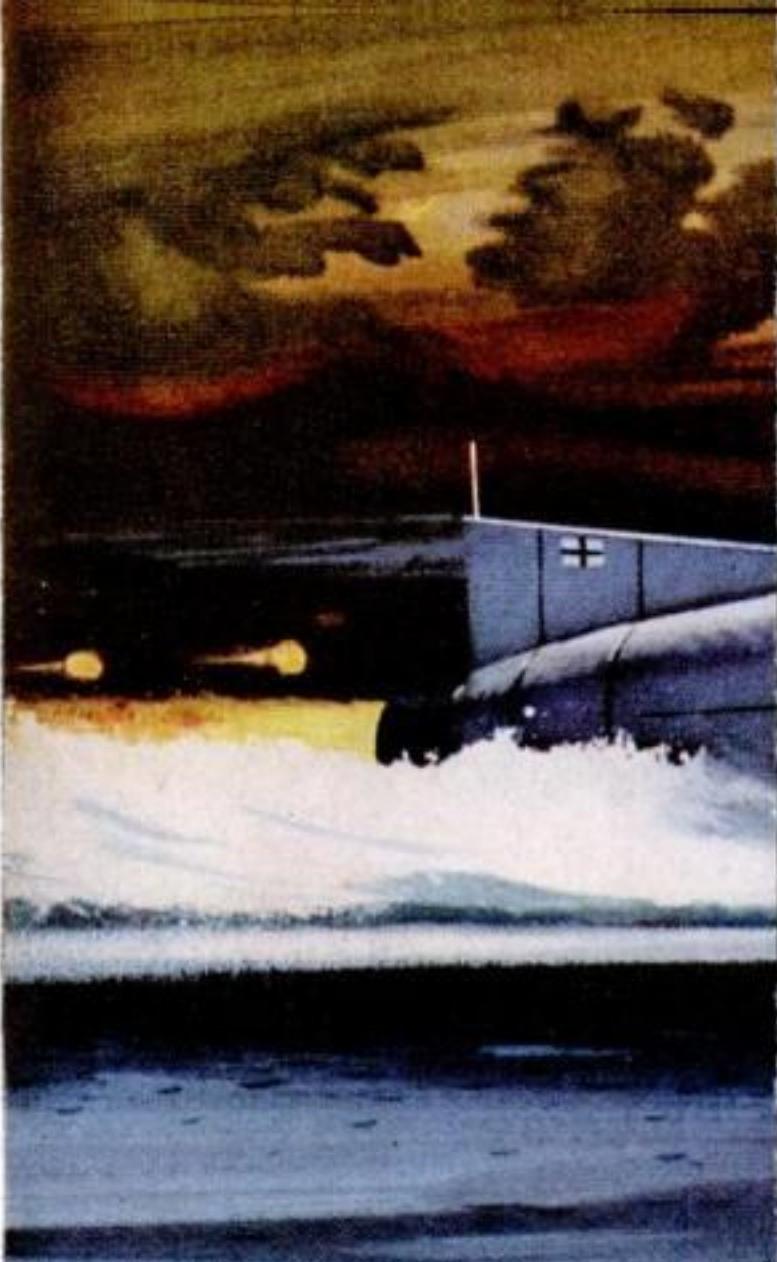
The tough problem lay overhead: How to pour extra power into the trolley system and through the pantograph (the pickup on top of the engine). Added air resistance at speeds above 200 m.p.h. called for some 12,500 hp., three times the locomotive's normal capacity. Special cable installations, higher voltages, and mobile substations to feed in the needed extra juice were the answer. During the record run the pantograph raced along at a 100-yard-a-second clip, continuously picking up 4,600 amps of current along the sliding mechanical contact.



249 m.p.h.

That peculiar lobster-like craft is the latest turbojet hydroplane, Bluebird, which Donald Campbell piloted across Lake Coniston, England, last November 10, to set a 249-m.p.h. record on water.

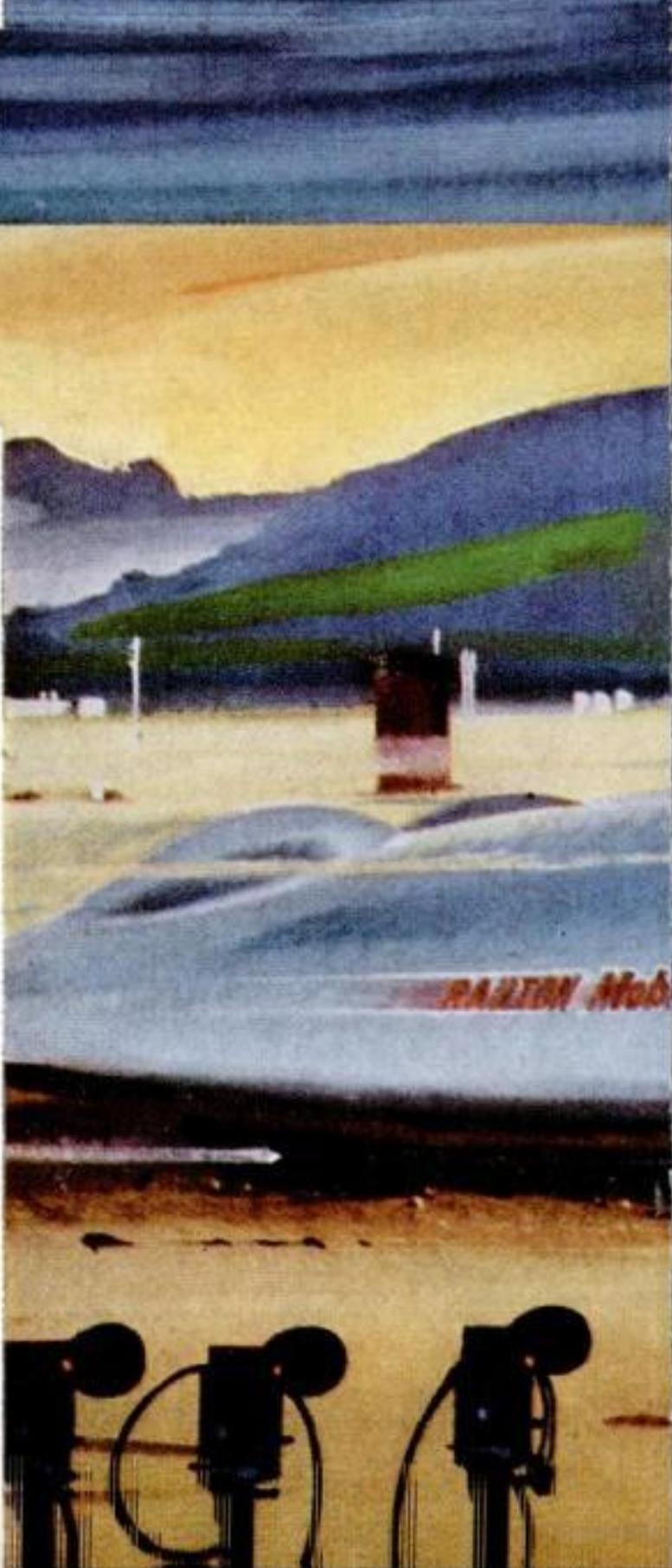
Racing Bluebirds is a Campbell family tradition. Campbell's father, Sir Malcolm, one-time holder of both land and water speed records, piloted the first jet Bluebird in 1947. The current version weighs $2\frac{1}{2}$ tons, is built of high-strength steel, and has a jet engine of 4,000-pound thrust. In it, Donald has broken the 200-m.p.h. "water barrier" (a water equivalent of the sonic one) and has his sights on 300 m.p.h. this year. At the same time, contenders for car honors at Bonneville should know that Donald Campbell is coming there, too. The 37-year-old Englishman has plans for a car in which he hopes to break John Cobb's record.

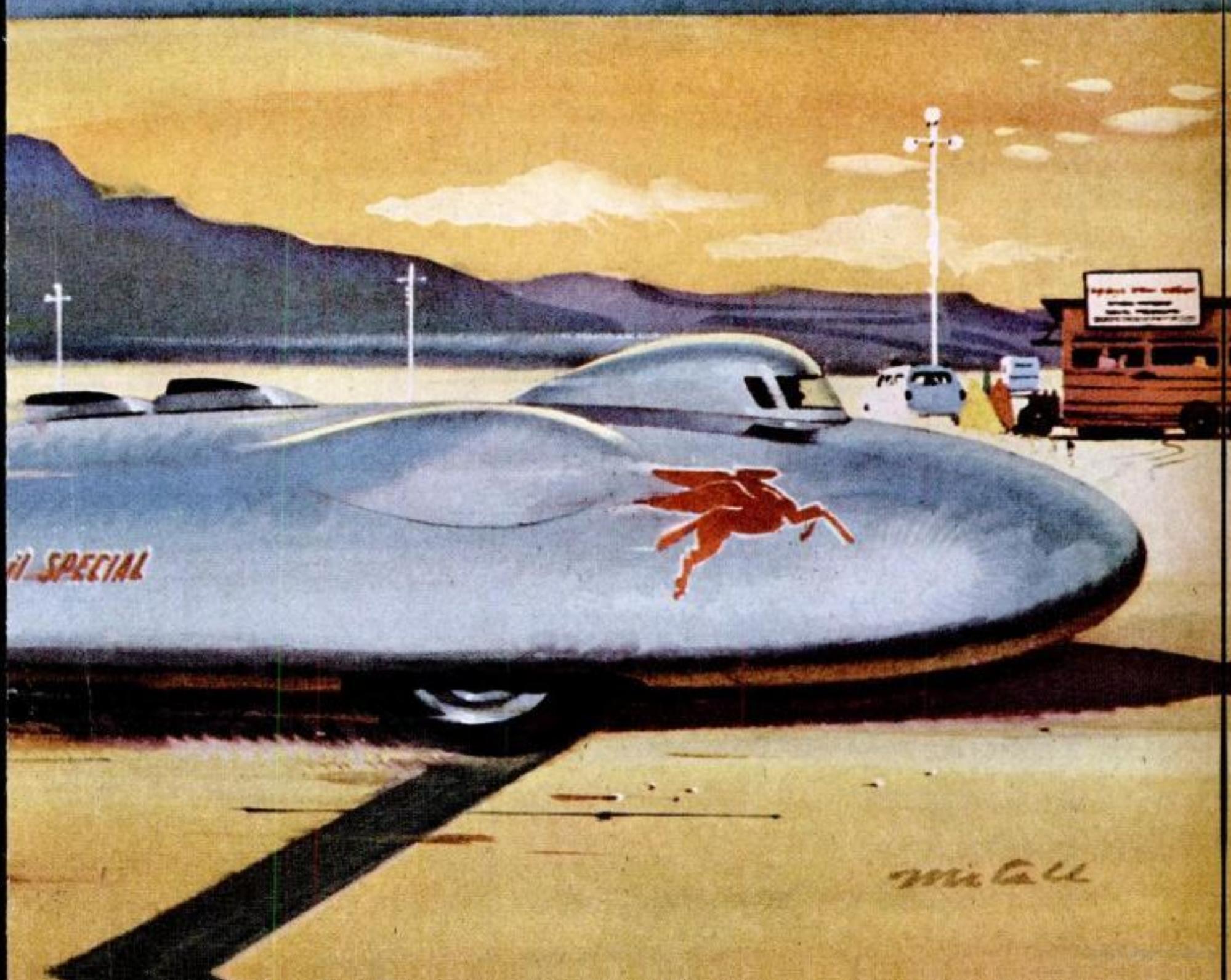
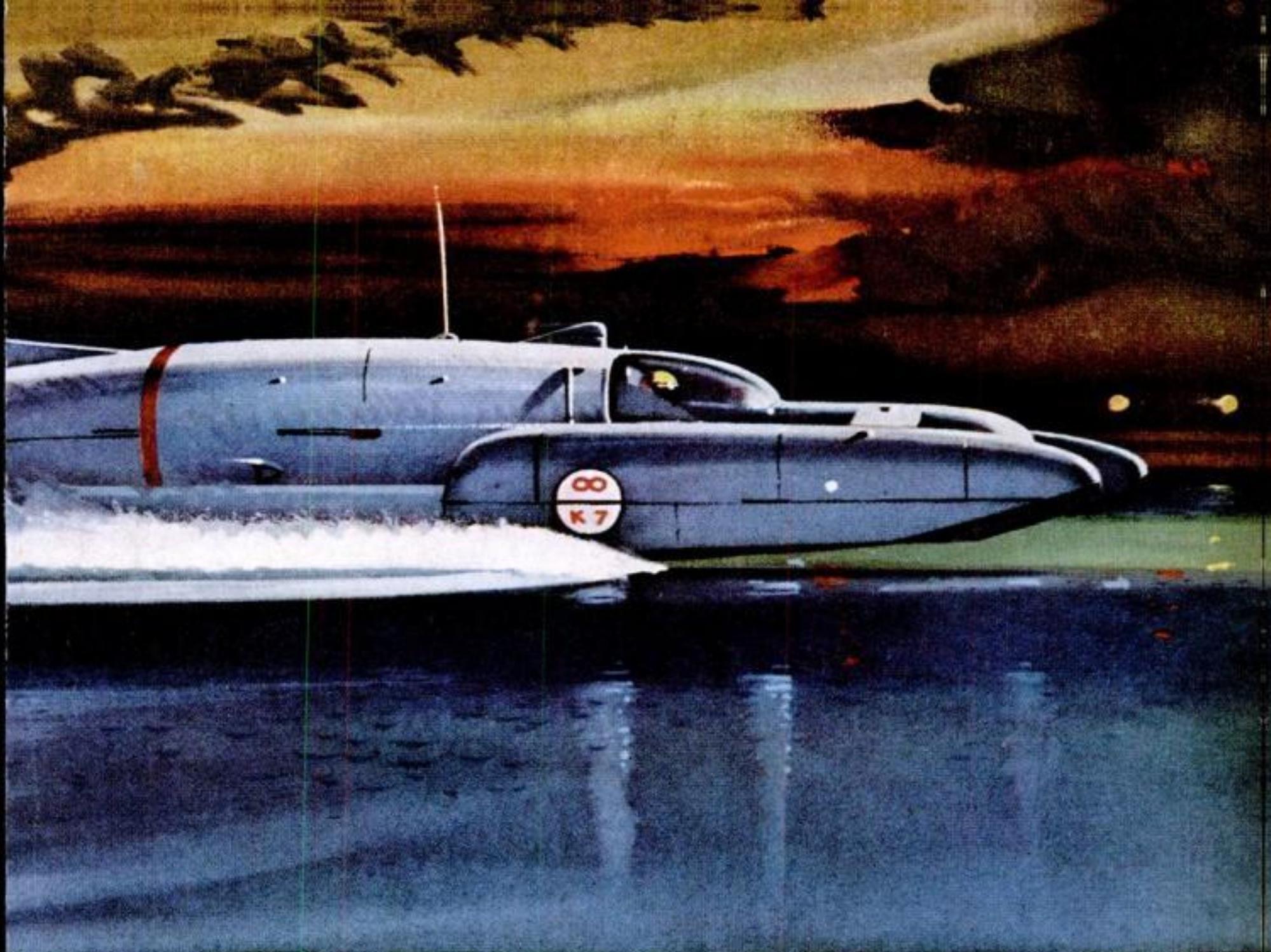


394 m.p.h.

The Bonneville Salt Flats in Utah become as dry and flat as they ever do by late summer: perfect conditions for speed-testing a car along a measured mile. Here, on September 16, 1947, English sportsman John Cobb topped his former triumphs to set a 394-m.p.h. record.

The streamlined colossus he drove was almost 29 feet long and over four feet high at its cockpit bubble. Designed by Reid Railton and sponsored by Mobil Oil Company, the "Railton Mobil Special" was powered by twin 12-cylinder Napier-Lion engines with 2,500 brake horsepower at 3,300 r.p.m. Cobb, who spent a lifetime flirting with speed, said his goal was to push his racer over 400 m.p.h. (which he did do unofficially). Equally fascinated by fast boating, he was killed in 1952 trying to break the 200-m.p.h. water barrier.





© 1958 Esso Products

632 m.p.h.



The **fastest man on earth**, Col. John Paul Stapp, said after his historic rocket sled ride: "It felt as though your eyes were being pulled out of your head." Strapped onto his "shoebox with a seat" out at Holloman on December 10, 1954, Stapp accelerated to 632 m.p.h. five seconds after the sled's nine propelling rockets were fired. He coasted half a second, came to a dead stop one second later. More than simply setting speed records, he had demonstrated that a human being could withstand extreme windblast (there was no shield), and deceleration 35 times the force of gravity.

The sled was held in position by steel legs that gripped the track lightly enough to allow it to slide with a minimum of friction. Bucket brakes dug into water between the rails to stop it—a few feet from the end of the 3,500-foot runway.

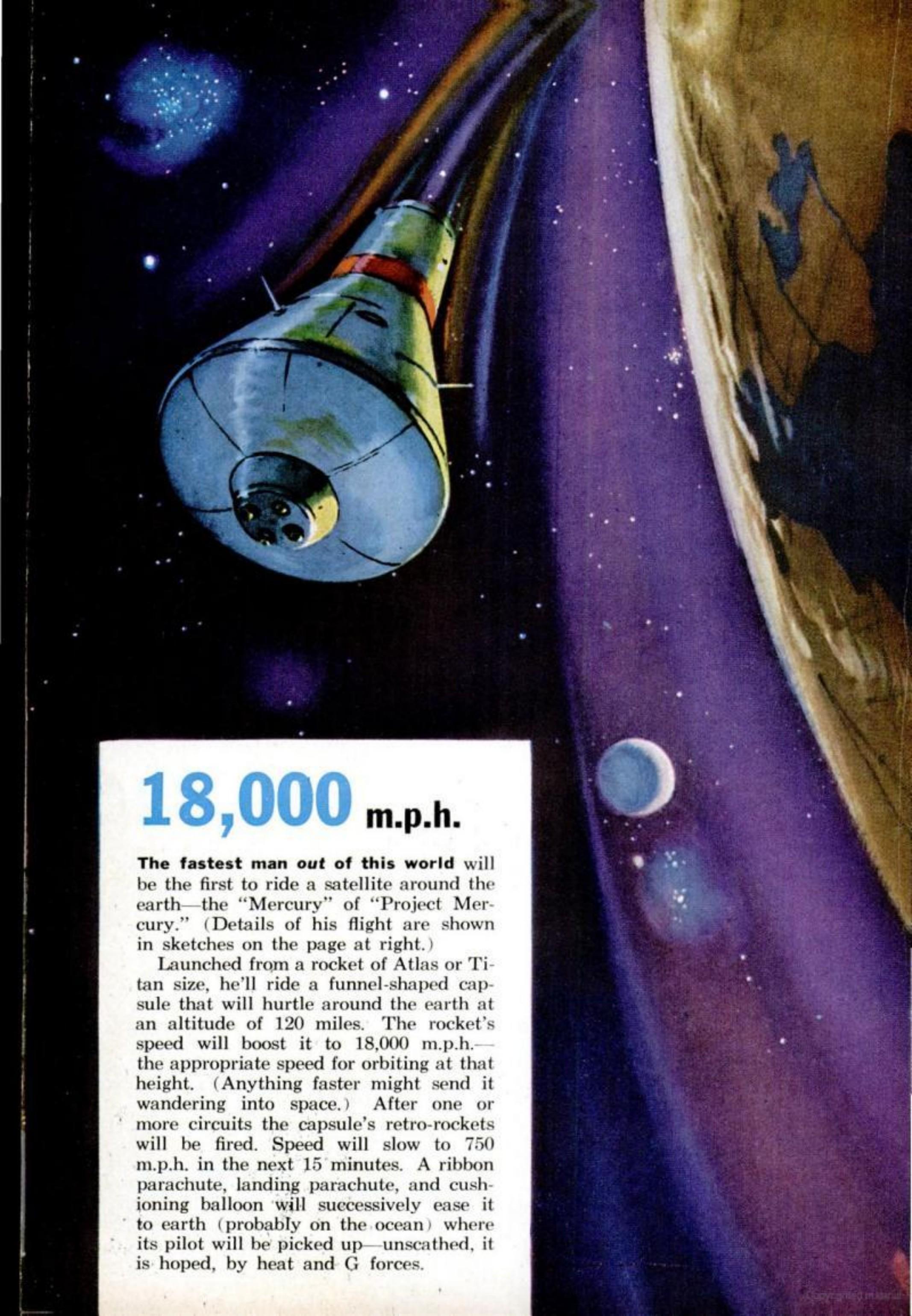


2,260 m.p.h.

Up 30,000 feet over Edwards Air Force Base in California, the swept-wing Bell X-2 rocket plane dropped from its B-50 perch and pointed its hummingbird nose skyward. Two minutes later it was a mass of tangled wreckage in the Mojave Desert—its pilot, Captain Milburn Apt, killed. But the day, September 7, 1956, established what was then the speed record for manned flight—2,260 m.p.h.

Built to withstand the "thermal thicket," the X-2 was unconventional. Its stainless-steel wings, K Monel fuselage, specially tempered glass and silicone-rubber seals had to meet extremes of 1,800-degree heat and minus-100-degree cold. The powerful rocket planes now being tested will top that 2,260-m.p.h. record (and the record 126,000-foot altitude of an earlier flight) but will owe much of their success to the pioneer X-2.





18,000 m.p.h.

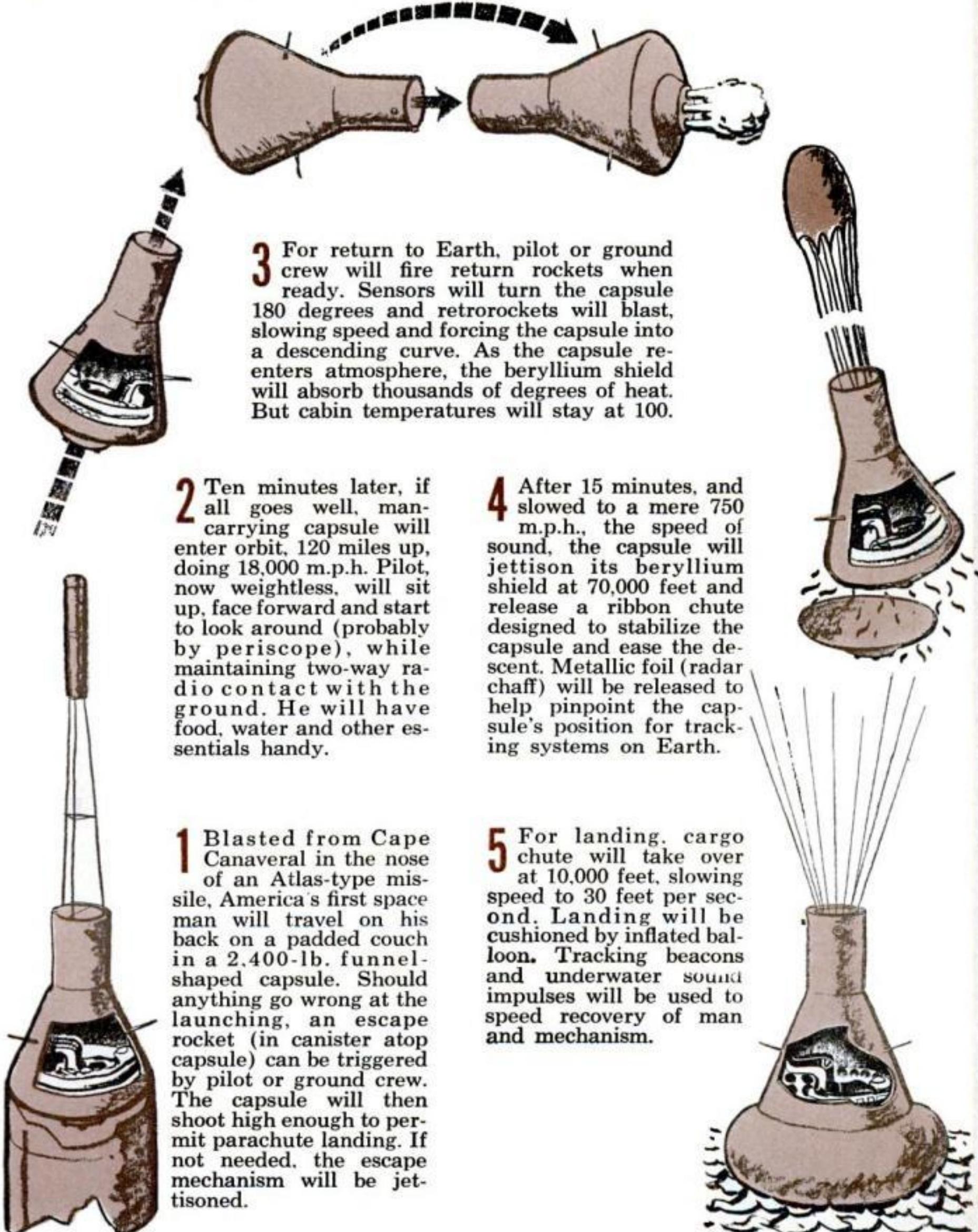
The fastest man out of this world will be the first to ride a satellite around the earth—the “Mercury” of “Project Mercury.” (Details of his flight are shown in sketches on the page at right.)

Launched from a rocket of Atlas or Titan size, he'll ride a funnel-shaped capsule that will hurtle around the earth at an altitude of 120 miles. The rocket's speed will boost it to 18,000 m.p.h.—the appropriate speed for orbiting at that height. (Anything faster might send it wandering into space.) After one or more circuits the capsule's retro-rockets will be fired. Speed will slow to 750 m.p.h. in the next 15 minutes. A ribbon parachute, landing parachute, and cushioning balloon will successively ease it to earth (probably on the ocean) where its pilot will be picked up—unscathed, it is hoped, by heat and G forces.

5 Steps Into Space

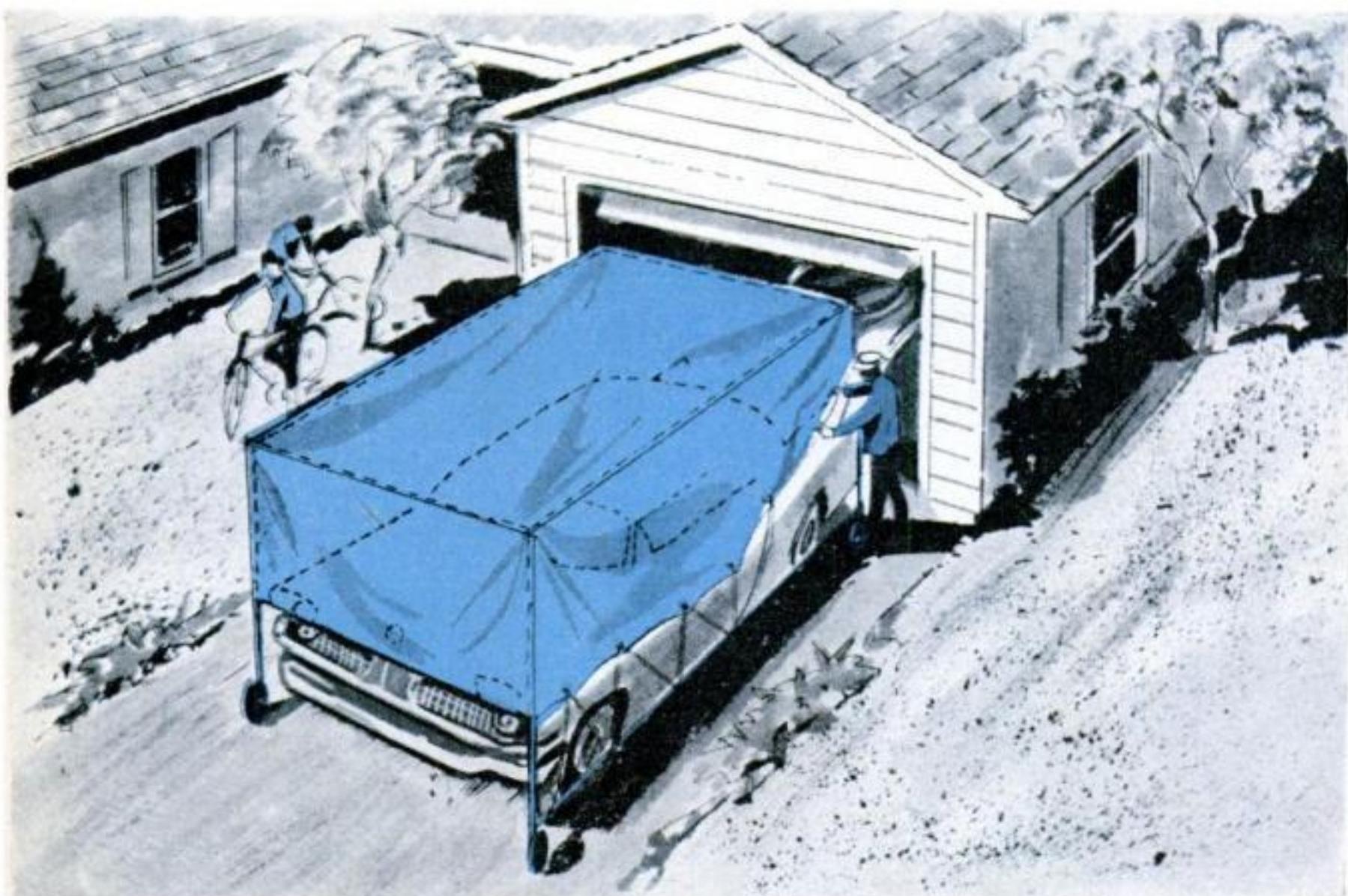
PROJECT MERCURY is the National Aeronautics and Space Administration's \$200-million plan to put a man in space and bring him back. McDonnell Aircraft has designed the capsule; other firms are

working on guidance and control. The pilot will be picked from 110 Air Force officers now being trained by aeromedical scientists. Launching date? 1961 or '62. Procedure? Something like this:



New Ideas from the Inventors

.....



1 Second Garage Nests in First. Telescoped into a one-car garage, this recently patented shelter could be rolled out when needed to cover a second car.

When it wasn't in use, the wheeled frame would be moved into the garage with its canvas sides and ends rolled up so the first car could drive through it.

2 Electric Screen Kills Bugs. Insects that flew between a grounded outer screen and a high-voltage inner one on each side of this bug eliminator would electrocute themselves. Grounding outer metal would make it safe for people. Dead insects inside would attract others.

3 Brush Twists into Tight Spots. A right-angled, rotating paintbrush like this could be used with long, even strokes in narrow spaces, and would squeeze into corners that a conventional brush often misses. The head could be turned to any desired position on the offset handle.





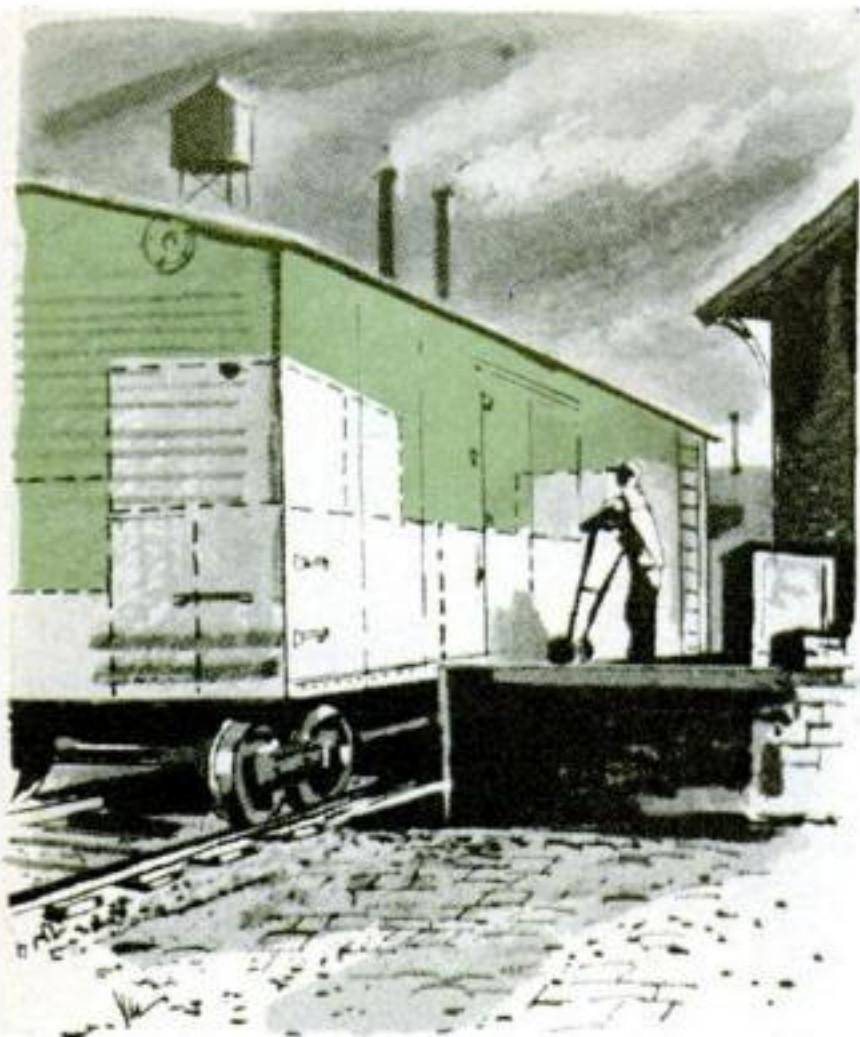
4 Blind Cuts Street Noise. Deeply ribbed slats, says this inventor, would muffle noise by intercepting sound waves and deflecting them in all directions. The slats would permit light and air to enter, and could be assembled Venetian-blind style or in a room-dividing screen.

5 Seat Belt Fastens Itself. This safety strap would remember to lock you in even if you forgot. Attached to inclined rollers, it would automatically ride down—and latch itself—as the doors were closed. Opening either door would unlock the belt and slide it up and away.

6 Wheeled Boat Rides or Floats. You wouldn't need a trailer to haul a boat that had these let-down wheels. They'd also help you maneuver the boat in or out

of the water. When the wheels were retracted, cover plates would smooth the lines of the hull. Buoyant chambers would compensate for added wheel weight.





7 Air Prevents Freight Shift. Cargo couldn't slide around inside a moving freight car, tanker, truck, or plane if it was pressed down by an inflated air bag. Self-adjusting to any shape, the flexible bag would speed freight handling and protect both contents and carrier.

8 Timed Spray Demothes Closet. You'd have less cause for worry about moth larvae attacking your woollens if you had a closet protector like this on the job. You'd preload it with five or six cartridges containing insecticide and a propellant gas. Then, once a month, a spring-loaded, clock-driven pin would puncture a cylinder and release insect-killing spray.



9 Ladder Moves with Job. Instead of climbing up and down to move this ladder to a new work area, you'd "walk" it along by pulling a pair of levers. Two extra legs would rest on ground-gripping shoes, the regular ones on casters. When the lever arms lifted and moved the shoes, the castered legs would follow.

The following patents have been issued on these inventions:
 1. Patent No. 2,852,814 to E. Bignardi, Santa Maria, Cal.; 2. No. 2,399,112 to C. Glover, Tampa, Fla.; 3. No. 2,841,810 to C. Reinhard, Dayton; 4. No. 2,849,077 to E. Kopke, NYC; 5. No. 2,858,144 to D. Oppenheim, Forest Hills, N.Y.; 6. No. 2,851,705 to H. Smith, Richmond, Cal., and U. Bartmess, San Pablo, Cal.; 7. No. 2,764,950 to C. Finnell, Houston; 8. No. 2,827,203 to G. Stumpp, Mineola, N.Y.; 9. No. 2,845,208 to F. Antonietti, Herzogenaurach, Germany.

Copies of patents may be ordered, by number, from the Commissioner of Patents, Washington 25, D.C., at 25 cents each. To write to an inventor, if the address given above is insufficient, you may address him (by name and patent number) in care of the Commissioner of Patents.

Handling the Power-Boat Traffic Jam



By Arturo F. Gonzalez Jr.

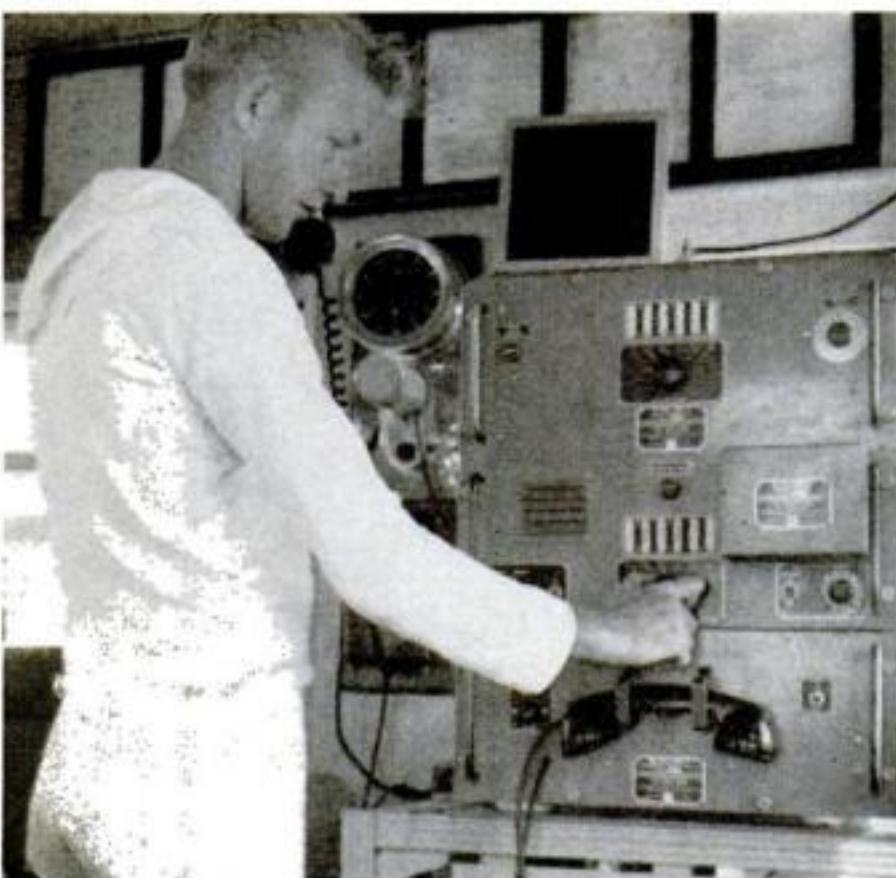
CHIEF Bosun E. S. Cinq-Mars, USCG, a stocky, blue-eyed 40-year-old career man with thinning brown hair, is the commanding officer of Coast Guard Group Three, the lifesaving and patrol unit (four lifeboat stations, 87 men, 17 boats and 12 trucks) standing watch over the 55 miles of Atlantic coastline from Fire Island to Coney Island. Through Cinq-Mars' waters plow more than 50,000 pleasure boats; over his waters soar thousands of aircraft, civilian and military, heading in and out of Idlewild, Floyd Bennett and Mitchel Fields. Along his waters nestle the beaches of Brooklyn as well as dozens of resort communities vulnerable to high

The waters of the south shore of Long Island are, during the summer months, among the busiest stretches of beachfront in the world. From April through October, refugees from the heat of New York City spill eastward onto Long Island and south to the rowboats, outboards, day sailors and cabin cruisers moored in profusion along the shoreline.

Watching over this flock of 50,000 small craft are the 87 officers and men of Coast Guard Group Three—the good shepherds of the south shore. The comings and goings of their charges—fishermen, water skiers, pleasure boatmen, racing sailors and charter-boat crewmen—have contributed to a watery traffic jam that defies description.

Recently writer Arturo F. Gonzalez Jr. spent a weekend with the men of Coast Guard Three as they maintained their vigil over the south shore's pleasure fleet . . . patrolling, searching, towing and boarding. Their story is the story of every Coast Guard station crew today.

It takes plenty of Coast Guard ingenuity, manpower and



RADIO COMMUNICATION links the four stations in the Short Beach Group with one another and with rescue planes, cutters and patrol craft.

water, gales and hurricanes. Cinq-Mars' responsibility: to keep everyone safe, 24 hours a day, 365 days a year.

No one has to tell Cinq-Mars that there's a boating boom on, nor that a few of these new summer skippers are unable to handle a boat properly. Looking over the accumulation of collisions, capsizings, ditchings, groundings and founderings his unit has had to handle in the past year, he can only fall back on his favorite saying, a rueful, "It takes all kinds of horses to make a race."

Battle plans. Like a beleaguered general, Cinq-Mars husbands his forces carefully and backs them up with as much logistical support as he can. His defensive position rests on the series of slender sandy islands on which his four lifeboat



RESCUE BOATS are standing by at the station at all times ready for an emergency. The first two serial numbers indicate a boat's footage.

stations are deployed. Behind him is the bay, full of boats; in front of him is the ocean, dotted with weekend seafarers.

His combat communication consists of the "land line" (telephone contact between stations), radio and a teletype network that feeds directly into Coast Guard District Headquarters at the Custom House on the lower tip of Manhattan.

Cinq-Mars keeps his scouts out, too. Each station maintains a 24-hour watch in high lookout towers from which observers can spot distress miles away and radio for help. During the summer months, he also sends out his 36-foot boats on inlet patrol, shepherding traffic from the bay to the ocean and back again. Protecting his rear he has several boats of the Coast Guard Auxiliary. Various



HIGH AND DRY, Jane IV is a long way from water. She went aground when tide slackened. Coast Guard pulled her off on the next tide.



A CLOSE ONE: With a crowd of fishermen aboard, the skipper may find it hard to see. Here he's coming dangerously close to another boat.

patience to cope with the seamanship of "Sunday skippers"

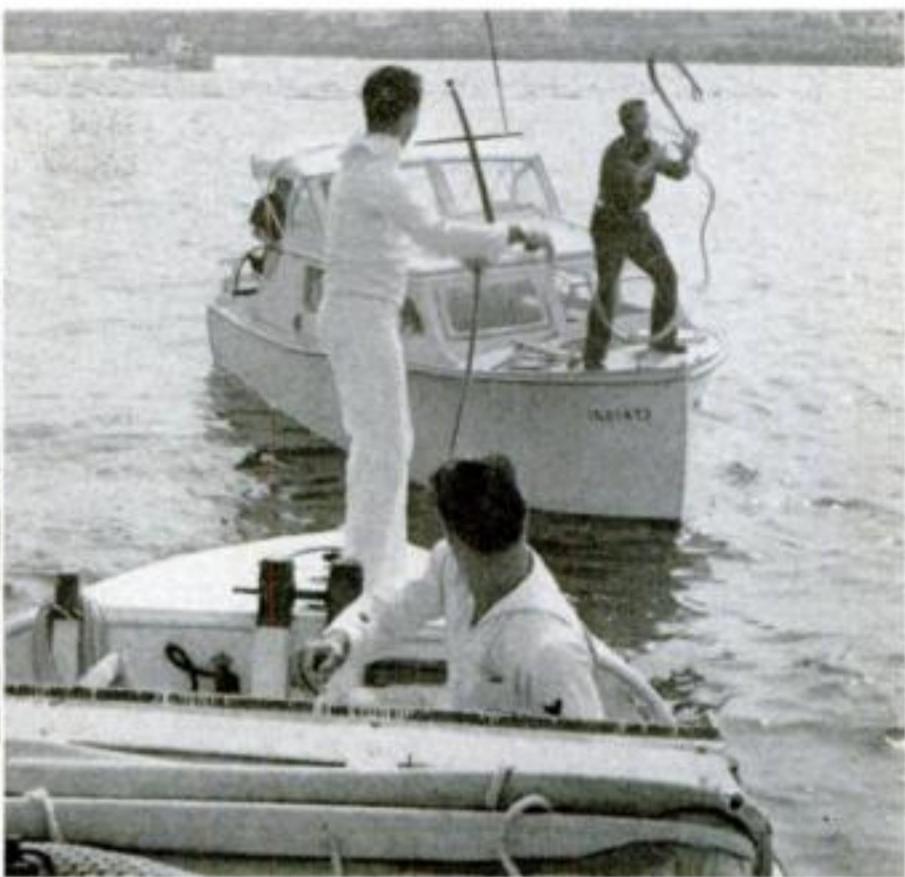


ON INLET PATROL, Coast Guardsmen cruise the shoreline all day, spot-checking for trouble. Radio calls from headquarters direct them.

members of this unique organization voluntarily give up their weekends in rotation during the summer to station themselves up channel and keep a watch out for trouble.

Mayday is the word for trouble. If further reinforcements are needed, Cinq-Mars can quickly get the aid of Coast Guard helicopters from Floyd Bennett Field, seagoing Coast Guard cutters in New York harbor and on nearby sea patrol, and the harbor-patrol boats of both the New York and Nassau County police. "We can have a boat underway towards trouble in five minutes after hearing 'Mayday,'" says Cinq-Mars.

His headquarters are at the Short Beach Life Boat Station, a concrete pillbox-like installation adjacent to Jones



"HERE, CATCH." Towing disabled boats to safety is a full-time job for the patrol crews who drop the cripples off at the nearest public dock.

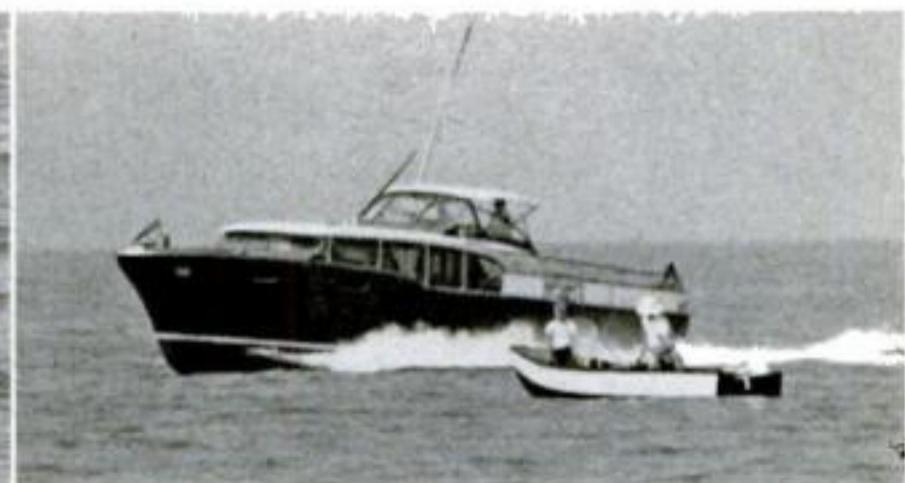
Beach and just a breeches-buoy shot from the pounding surf of the Atlantic.

"In the winter, it's so cold here even the gulls leave," one of his crewmen recently complained. But Short Beach is the nerve center of continuous search-and-rescue operations from early April through late September. "I keep all my men aboard all summer," Cinq-Mars explains. "They take their leavetime in the winter or not at all. And all my station commanders must similarly be aboard every summer weekend. Too many things pop at sea from Friday through Monday in the summers to risk letting our key men go ashore."

Some unsung heroes. Many of Cinq-Mars' "men" are really boys—youthful Coast Guardsmen—who at 19 and 20



OUTBOARDS FOR HIRE are a particularly pressing problem since they enable anyone with a couple of spare dollars to become a "seafarer."



"DON'T MAKE WAVES," the Coast Guard begs, but still power-boat jockeys seem to delight in speeding, with no regard for the consequences.



"LOOKS LIKE POINTS TO ME." The Coast Guard takes no responsibility for repairs, but is not above giving out a little friendly advice, or lending a helping hand in an emergency.

have the tremendous responsibility of lives and property placed in their hands.

They're young men like William Goff, an Engineman Third from upstate New York who makes model airplanes in his spare time, and who risked his neck to pull a couple of drowning youngsters out of a heavy sea just a few months ago. Or Russ Seymour, the Engineman Second at Short Beach who not long ago saved the crushed arm of a laborer working on a nearby jetty with some swiftly applied first aid. Modon, Skurski, Duggan, Abdulla, Tobisch, men from all across the U. S., do their job with pride and efficiency. Quietly mature in their own way, these men take in stride the dangers of rescue in heavy seas, scarcely noticing the monotony of patrol work. Among their rewards are a visible relaxation of military spit-and-polish on the station, an open pantry for snack-lovers, an oft-used TV lounge and, most important, the satisfaction of a job well done.

In the bustling little room that serves as the command post, search-and-rescue activities for all four stations are coordinated. Along one wall of this nerve center is a chart table, with charts of the local waters spread out across it and dividers and parallel rulers close by in case some quick headings and an idea of the mileage between the station and a boat in trouble are needed.

The command-post telephone jangles incessantly. A woman calls to complain that her cellar is flooded; she is told respectfully but firmly that this unfortunately is not Coast Guard responsibility



BOARDING PARTY, COAST GUARD STYLE: Once a disabled boat is towed to a safe mooring, Coast Guardsmen board her to check the operator's papers and the boat's safety equipment.

and that she should contact a plumber.

A beach walker reports a cabin cruiser apparently adrift. The station's 36-footer is dispatched only to return with two red-faced Coast Guardsmen aboard. There were people on the cabin cruiser all right—a man and a woman—and in no mood to be disturbed.

District Headquarters calls to report that a man's body has been sighted four miles east of the Jones Beach monument. A copter, the 30-footer and the Nassau police boat all converge on this one—most of the crewmen figuring this will be the corpse of the Air National Guard pilot they've been looking for since his plane ditched out at sea a few weeks previously. When the police boat pulls the "floater" up, though, it turns out to be a civilian. All craft return to station.

Jaywalkers of the deep. Rockaway Beach reports a weird one. A seaplane taxiing on takeoff is cut off by, and collides with, a speeding cabin cruiser. The boat is stove in, the plane nosed over, but outside of a few cuts and bruises no one is badly hurt. "High-powered engines and low-powered minds," Cinq-Mars mutters in disbelief.

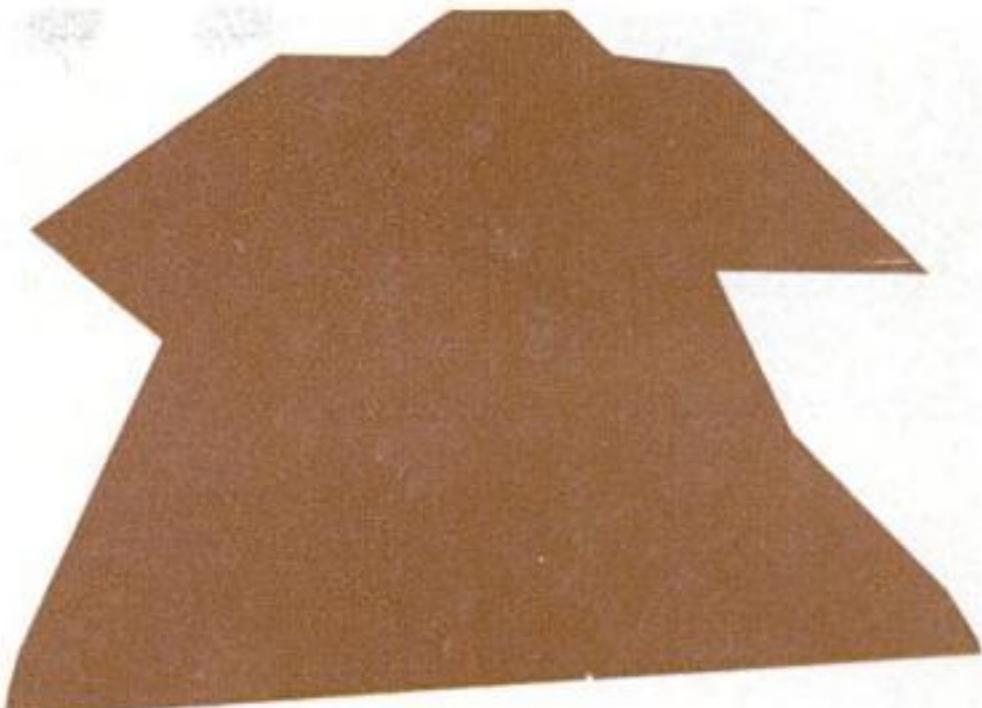
Rockaway reports in again. The Jane IV, a cabin cruiser, is "up on the infield grass"—firmly aground. Plans are made to dispatch a 36-footer to try to tow her off at the next high tide. Cinq-Mars makes arrangements so that Rockaway can be covered by boats from other stations in case she should suddenly need a 36-footer for another emergency.

[Continued on page 244]

What Is This Shape?

- A. Dress pattern for a woman's fur coat.
- B. Outline of a star constellation.
- C. An abstract drawing.
- D. Deck plan for a ship.
- F. A geometric figure.

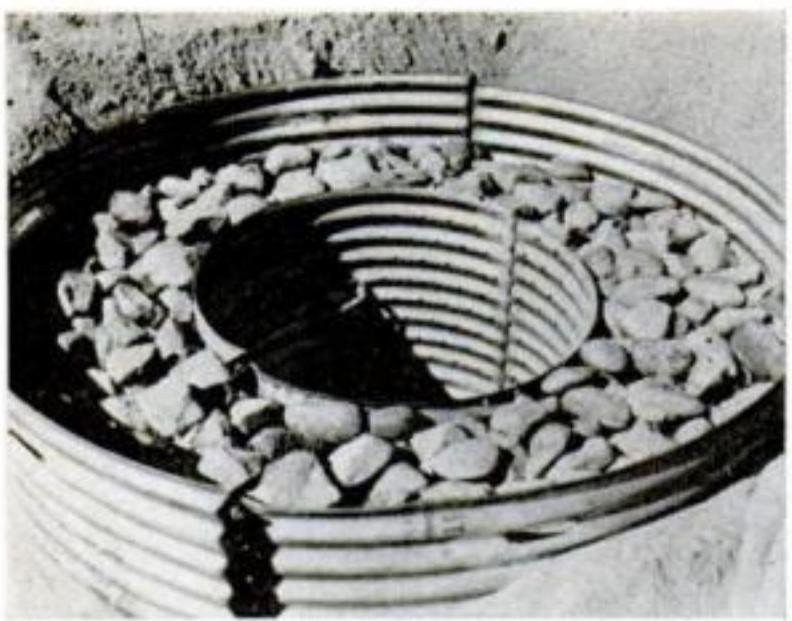
So now you have the answer.
Turn to page 115 to see how
it checks with ours.



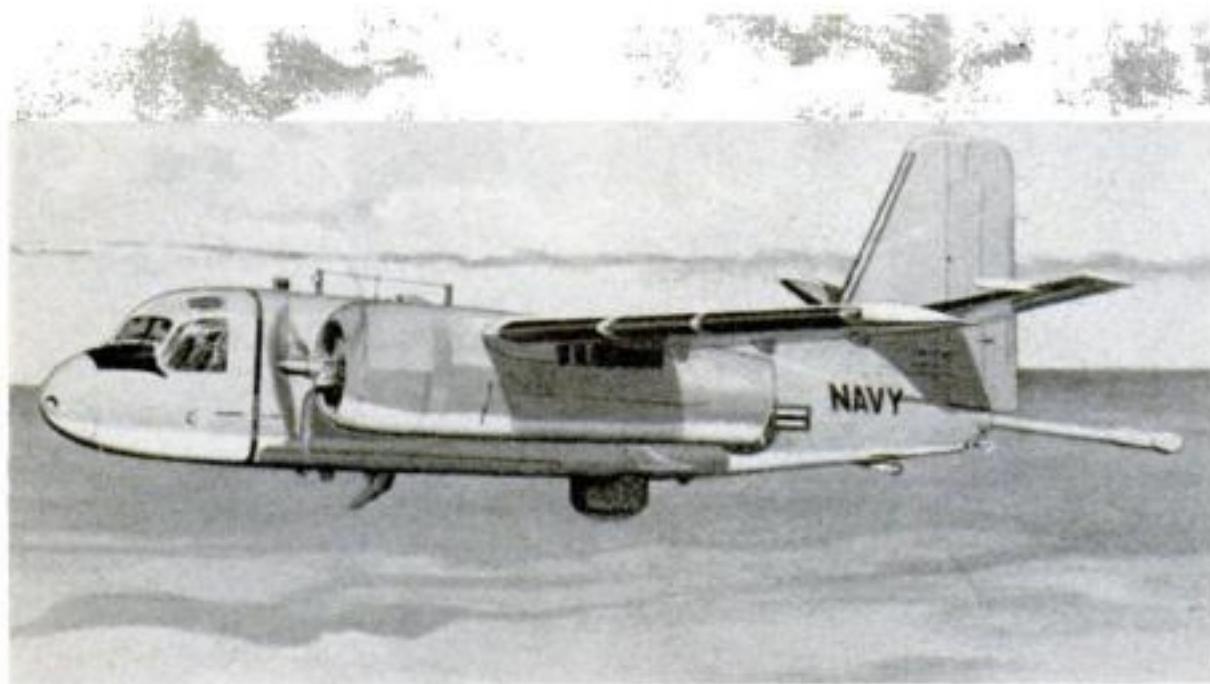
HALF HANGAR. No, this airliner didn't crash through its hangar. The hangar was built around it after it missed the runway at Lansing, Mich., skidded into a snowbank. Workmen needed warmth while repairing a damaged wing in sub-zero weather.



CLEAN SWEEP. This gas-powered vacuum sucks up leaves and rubbish, mulches the refuse in cutter blades. An extension nozzle (right) reaches under hedges. Besides the walking model shown, M. O. Allen, Long Beach, Cal., makes a twin-bag 36-incher and a self-propelled 60-incher for pros.



UNDERGROUND A-BOMB SHELTER. The corrugated-metal structure above at right was built entirely underground by the Army for high-explosive tests in the Arizona desert. Forty volunteers spent 24 hours in the 10-by-68-foot room without harm. Air is drawn in through the rock-filled vent at left which is protected by a perforated steel sheet.



SUB TRACKER. The Navy's new Grumman S2F-3, called a "futuristic" plane, is designed to fly the most modern electronic equipment and armament for hunting down submarines. In the artist's conception at left, its "MAD" (Magnetic Airborne Detection) boom is shown extended. The plane will carry four.



HEART COUNTER. The tiny instrument held above makes a cumulative record of heartbeats from electrodes attached to the skin. In the box on the desk is equipment formerly used.



SIT-APART SEAT. Wide armrests give passengers more room between seats on American Airline's Electra turboprops. The raised ridge holds game boards or a card table, guards drinks and snacks.

DECK PLAN.

Here's the correct answer to the "What Is This Shape?" outline on page 113—it's the deck of our newest aircraft carrier, Independence, largest and most powerful in the world.

This photograph was taken as the Independence, her mast lowered to clear the Brooklyn Bridge, was moved from her pier at the New York Navy Yard by 12 tugs for her first test run and the start of sea trials.

The 1,046-foot carrier was maneuvered expertly into the East River at a point where the river is only 1,200 feet wide.



FLOATING IN SPACE. Maj. Gen. Oliver K. Niess (left), surgeon general of the Air Force, and Col. John Paul Stapp are weightless here as centrifugal force, attained by flying a C-131 in a parabolic arc, matches gravitational force. The flight took place over Wright-Patterson Air Force Base, in Ohio, where Col. Stapp commands the Aero Medical Laboratory.

Learning to live with The Sonic Boom

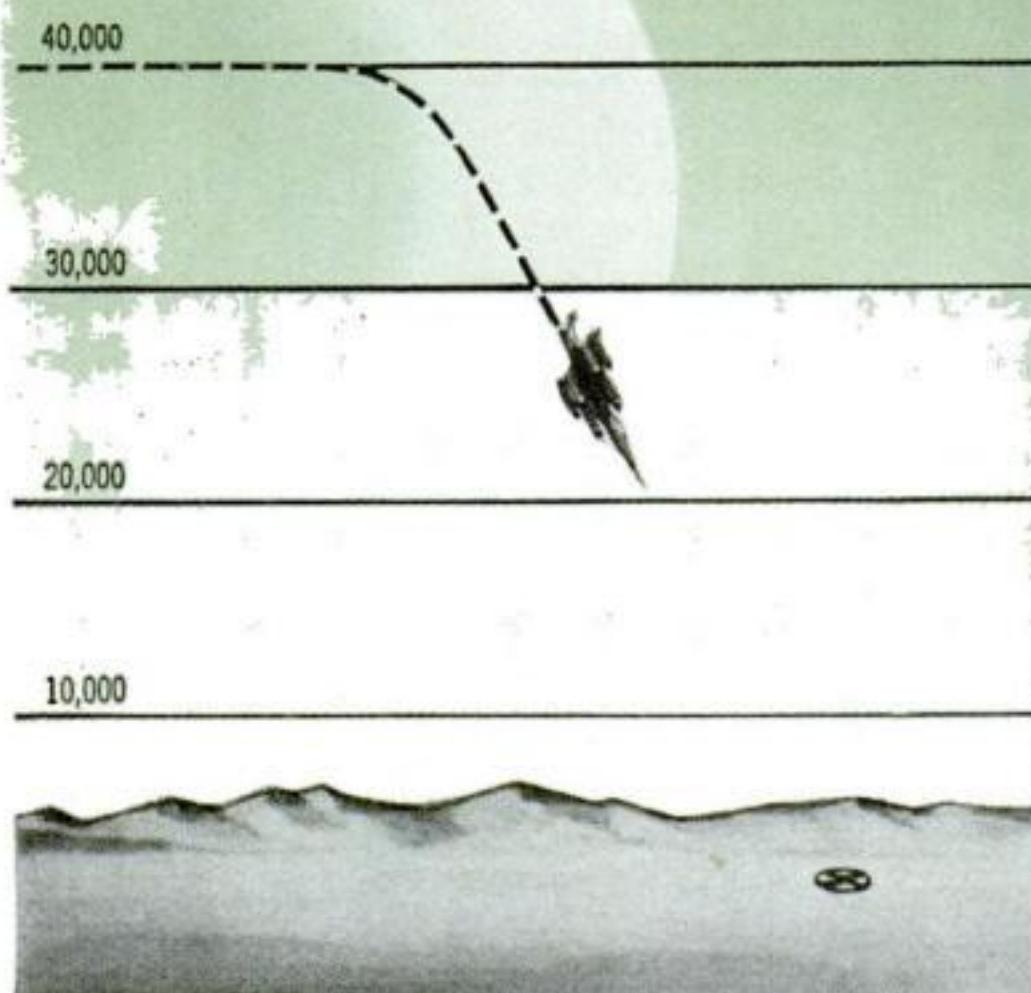
By Claude Witze

With newer, faster supersonic planes, the sonic boom will become as inevitable and unavoidable as thunder. Since we can't escape it, the next best thing is to understand it. This article, condensed with permission from "Air Force-Space Digest," official journal of the Air Force Association, tells the story.

IF YOU'VE never heard a sonic boom, it won't be long before you do. And you won't have to visit an air show or live close by an air base. It may awaken you from your sleep, or it may set dishes jumping in the cupboard at any hour of the day or night no matter where you live.

It's no longer a stunt performed by a diving fighter pilot to impress a crowd. The boom is becoming part of the day-to-day operations of the Air Force, an inescapable element of straight-and-level flight at supersonic speeds. We must learn to live with it, for in today's unsettled world we cannot live without it.

DIVING SONIC BOOM. Shock wave, created at the nose of the plane, continues to travel toward point on ground at which plane was aimed, even when the pilot pulls up. A single boom results.



But, except in rare cases, it will only assault your eardrums. It isn't going to crack the plaster or start any earthquakes. It may break a few windows. And that will be about all.

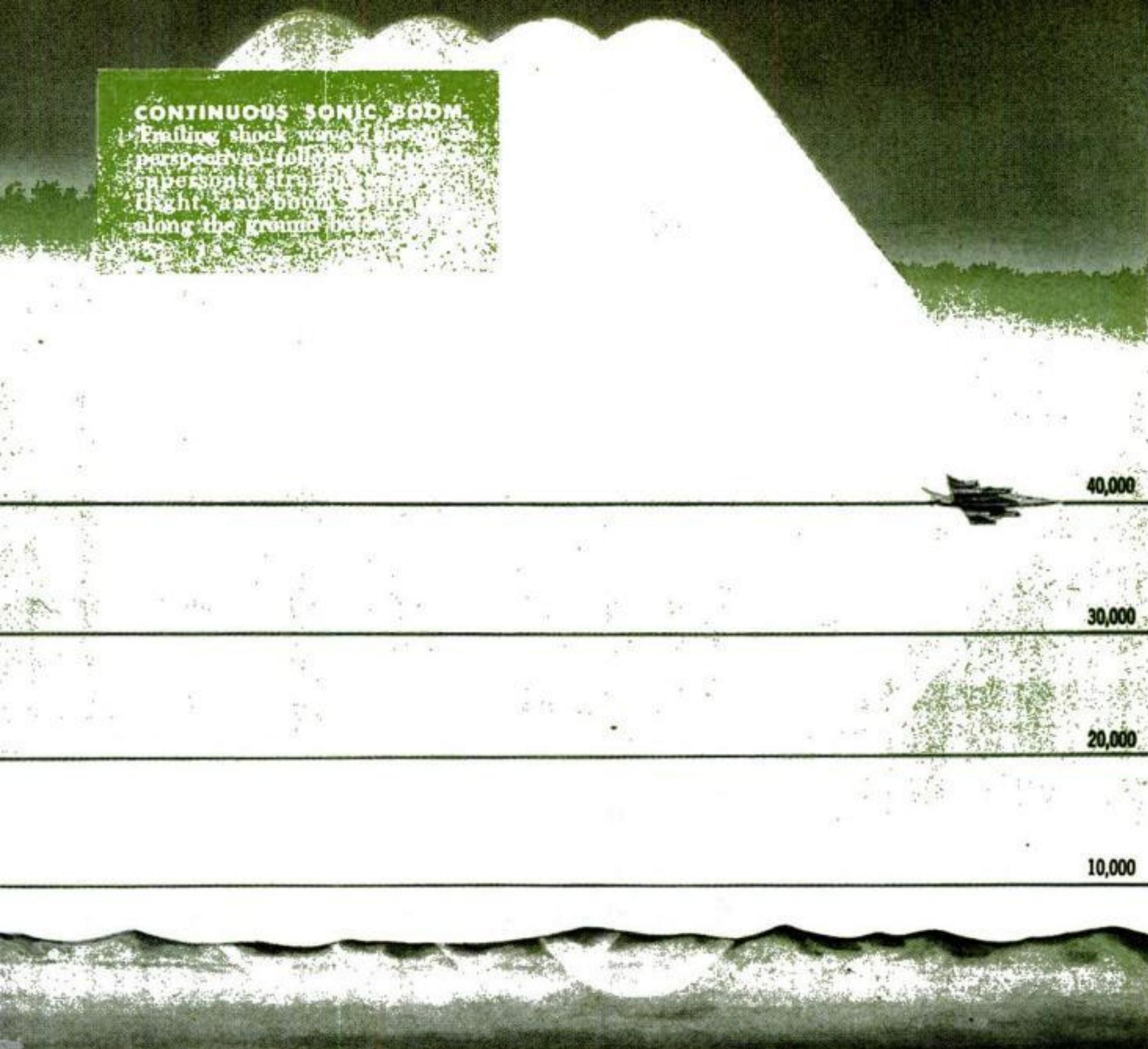
In the days of slower aircraft it was possible to go faster than sound by diving a fighter plane, such as the North American F-86, and directing the boom at an air show or the wastes of a desert. The public got the idea that the boom



STARFIGHTER: Lockheed F-104 is a Mach 2 (twice the speed of sound) interceptor. It is now operational with the Air Defense Command on both the East and West Coasts.

CONTINUOUS SONIC BOOM.

Existing shock waves from supersonic straight flight, and boom along the ground



was created as a single clap of thunder when the pilot passed through the "barrier" that faced him when he reached Mach 1, or the speed of sound. It was commonly believed that this was the end of the noise, that it would be heard again only if the plane slowed down to less than Mach 1 and then broke the barrier again.

The truth is that an aircraft capable of supersonic speed in straight-and-level

flight creates a continuous sonic boom. It follows the flight path of the aircraft; if it were visible it would look like a cone—in fact, like two cones. One of them has its apex at the nose of the



HUSTLER: Convair B-58, our first supersonic bomber, also has Mach 2 performance, and boom capability. It will become operational with the Strategic Air Command later this year.

DAMAGE TO
BRICK OR
FRAME
BUILDINGSDAMAGE TO
FLIMSY STRUCTURESSTRONGEST SONIC
BOOM RECORDEDCAN INJURE
HUMAN EARMAXIMUM
ROUTINE
SONIC
BOOMLOUD BOILER
FACTORYLOUD
THUNDERCLAPHEAVY STREET
TRAFFICAVERAGE
OFFICE

SOUNDS

plane, the other at the tail. The cones are shock waves that travel to the ground at the speed of sound (about 762 m.p.h.).

The two shock cones are so close they almost always sound like a single clap of thunder. If they were real claps of thunder they would impose a pressure of about one-half pound on each square foot of the earth or the obstacle in the way.

What is the pressure from a sonic boom?

Not more than five pounds per square foot—10 times that of a thunderclap, five times that in a boiler factory.

But the altitude of the plane, upward of 35,000 feet, and the loss of energy that muffles the shock on the way down, will keep the pressure below the five-pound level.

More boom than bust. This means the boom is not strong enough to inflict structural damage on the flimsiest chicken coop. Tests have shown that it takes a pressure of 70 or more pounds to damage ground buildings. In fact, tests with nuclear explosions have shown that it takes 150 to 300 pounds per square foot to damage brick or frame building construction.

The strongest sonic-boom pressure ever recorded was 33 pounds per square foot, measured on a mountain top, with the aircraft only 280 feet away.

But when people hear a noise that is roughly 10 times as loud as a clap of thunder, they immediately start looking for damage.

In an area such as southern California, where as many as 90 supersonic aircraft may be in the air at a time, this leads to serious complications.

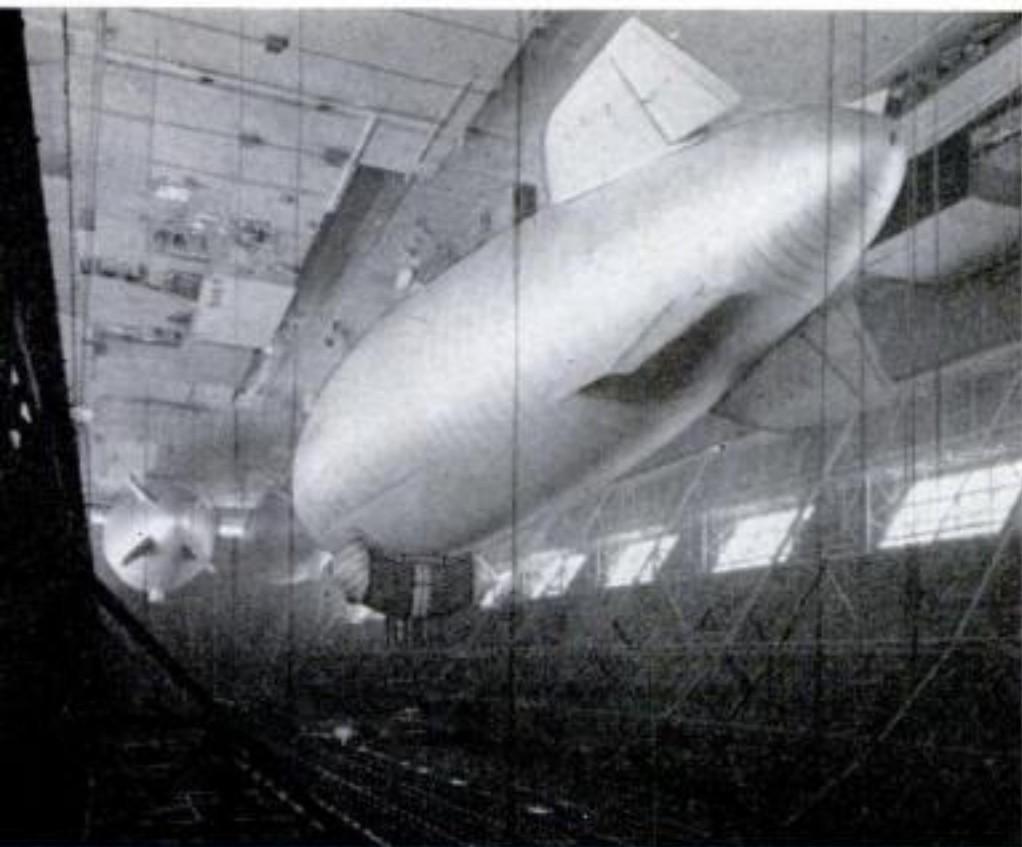
Under existing law, claims must be settled by the perpetrator: Air Force, Navy or manufacturer. But it is difficult in some cases to identify the airplane that broke a window.

Air Force general policy, followed in facing demands for payment, includes these considerations:

- Plate and window glass may be broken by shock waves.

[Continued on page 242]

WHEN IS NOISE OBJECTIONABLE? Not until it exceeds 128 decibels, or about one pound of pressure, tests show. Somewhere between three and 10 pounds of pressure (138 to 148 decibels) large plate-glass windows may break. It takes louder noise to crack small panes.



GIANT AIR DOCK. For space to build airships, such as the 1,500,000-cubic-foot ZPG-3W in foreground, Good-year put up this hangar. It measures 300 by 1,200 feet—room for 7½ football fields.



BIG TOP. No clowns and acrobats perform in the circus tent at top here. It was erected by a contractor in Burlingame, Cal., over a new hotel site to shield foundation work (lower photo) from rain.



JUNIOR JATO. A rocket is inserted above in one of the nacelle fairings of a two-engine Beechcraft to provide added standby power. It is the first used in a private plane, increases climb 500 feet a minute.



FLIP LAMP. To get light inside its freight cars, the Wabash Railroad installed these hinged fixtures at its Chicago loading docks. A lamp is pulled into position by hook, swings back on a spring if the car moves.



PIG NURSERY. After a mama sow died, Fred D. Scott of Nashville, Tenn., rigged a substitute in the trunk of a junked car. He warmed it with a light bulb. Chow line is a row of pop bottles in holes in a plank.

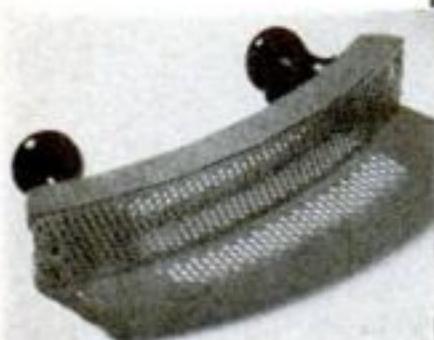


What's New

LIQUID RUBBER in a tube, one of newest "wonder" adhesives, repairs car gaskets, also bonds wood, plastics, metals, leather, fabrics and glass. Devcon remains elastic.



NEW CONVEX PLANE, latest addition to Stanley's line of Surform shaping tools, forms curves in wood and metals. Price is \$3.69.

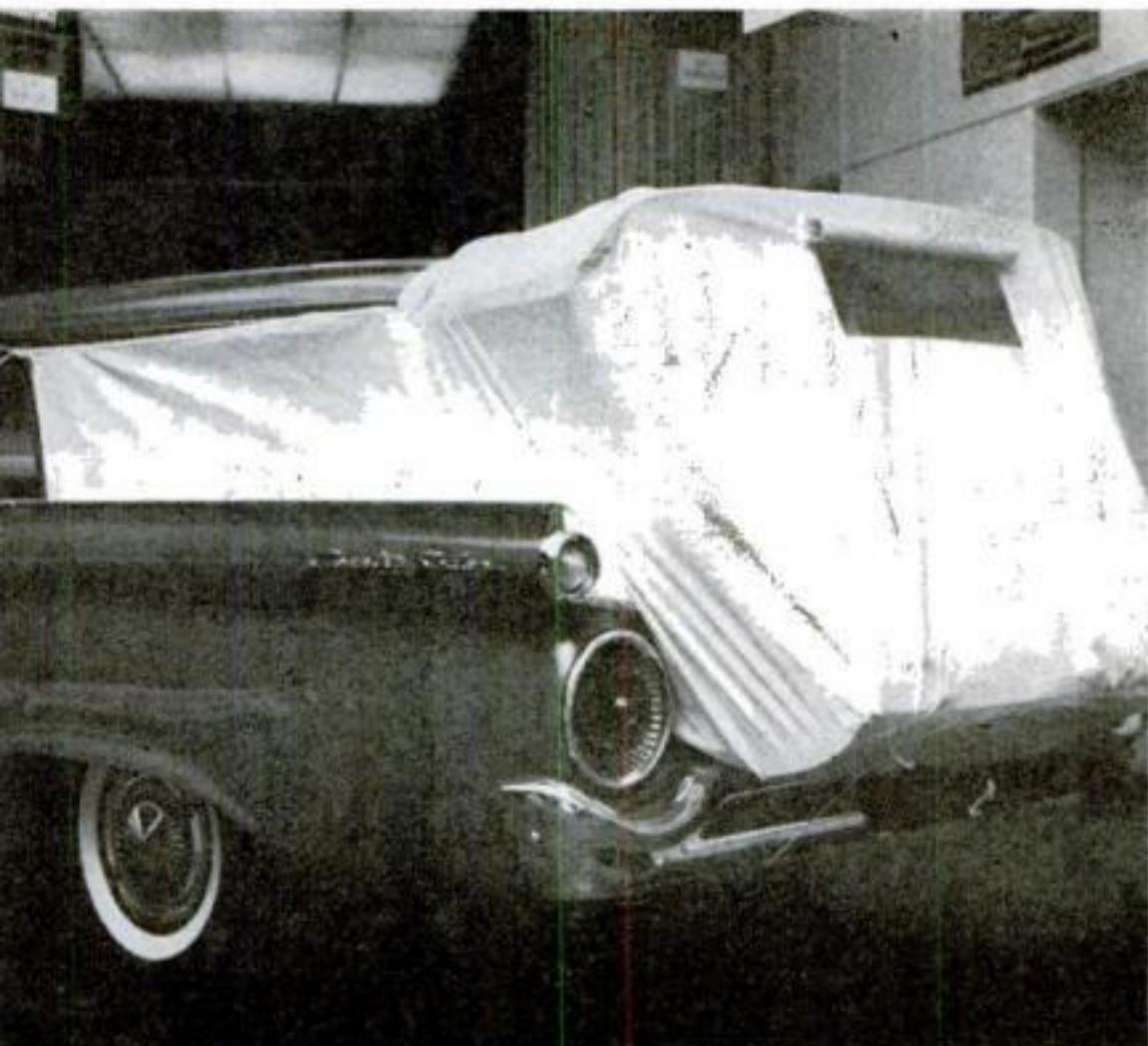


BABY GREASE GUN lets you lubricate car and other fittings inexpensively yourself. Bottom plunger pushes grease up and top plunger "shoots" it in. About \$3 from Plews.



for the family car

Want an armrest for your right arm while driving? "Ride-Eze" hooks over the front seatback and provides foam-rubber comfort at several adjustable heights for about \$6 . . . Volkswagen—that car of many faces (or bodies)—will soon appear in a snappy Australian fiberglass body with fold-down front seats for camping. Said to weigh 300 lb. less than standard VWs, it will sell for \$3,900 . . . For that extra boost to help you get up and under the hood while making repairs, Bear Mfg. Co. provides a collapsible step that you hook over the front wheel . . . Have any saggy, baggy front springs that bottom on every bounce? Clip-on coil stiffeners from Wright-Hall Products are said to end discomfort and tire wear . . . Eye-catching plastic hubcaps now come in 20 color combinations for 14" or 15" wheels from Colorado Fiberglass Corp. They're dent-, scratch- and rust-proof—but not theft-proof . . . Two car aids that now come in pushbutton spray cans: Instant Simoniz, said to take the elbow



"DISPOSABLE" CAMP SHELTERS are now made of nylon-reinforced paper at a fraction of the cost of similar canvas types. Varicolored tents, "parawings," and sleeping bags at right cost as little as \$10 to \$20, the station-wagon enclosure above about \$6.50. Marketed by Ford, they're tough, waterproof, won't burn.



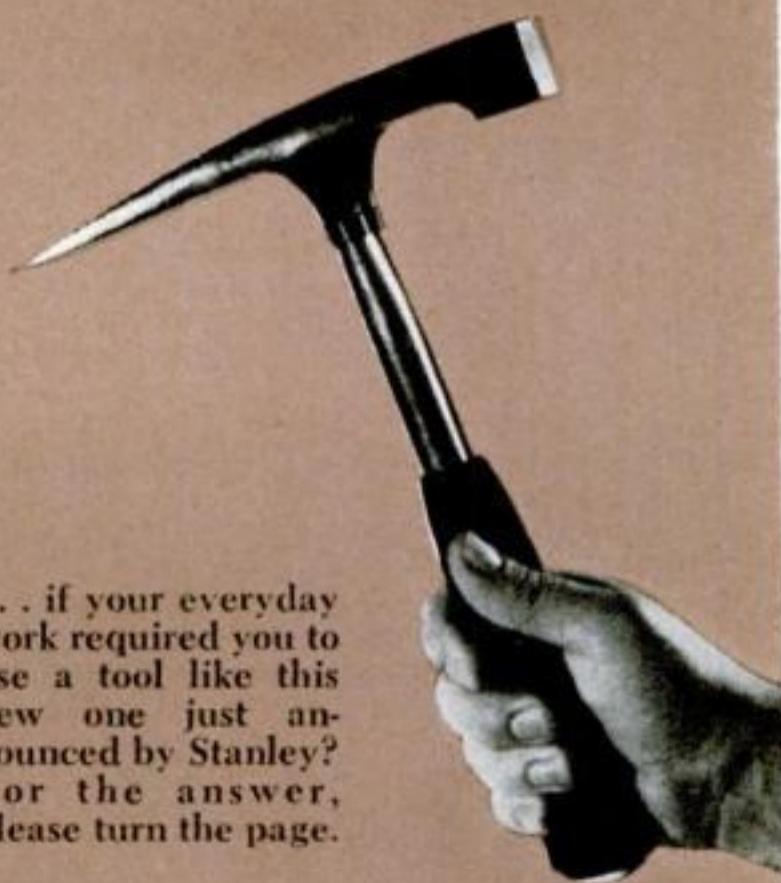
QUICK-FILL FIRE EXTINGUISHERS save you waiting for factory refills. Ball-shaped Ansul type is simply discarded and a new "ball" screwed on. Tall Walter Kidde model is pumped up at any gas station. Both are 2½-lb. dry-chemical types.

grease out of waxing your car; and Free-O-Mist anti-fog spray for windshields, mirrors and glasses, made by Botco.

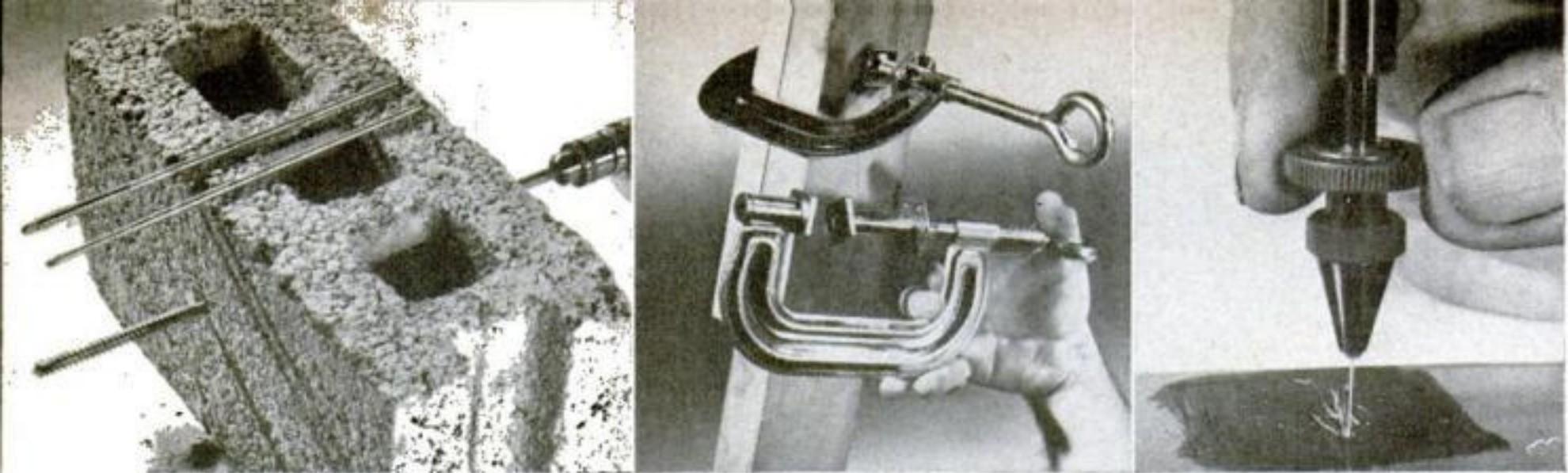
the latest in tools

An 8" tilt-arbor saw that converts to a tilt-blade jigsaw is being sold by American Machine and Tool Co. for \$24.95. The tool's unique assembly allows the changeover to be made in just three minutes, says the manufacturer . . . Need both hands to keep an even pressure when filing saw teeth? Calgo Manufacturing Co. makes a tool that holds circular saw blades under proper tension while you're filing. Adjustable for 6" to 18" blades, the tool will also secure the blade so you can set the teeth with a hammer against a sloping anvil . . . Storage cabinets for nuts and bolts now come in colors. Campro Products sells plastic chests—with adjustable bins—in tangerine, beige and turquoise . . . A new Safe-T-Planer accessory for wood surfacing can be used in any drill press with a 1/2"

What Would Your Trade Be?



... if your everyday work required you to use a tool like this new one just announced by Stanley? For the answer, please turn the page.

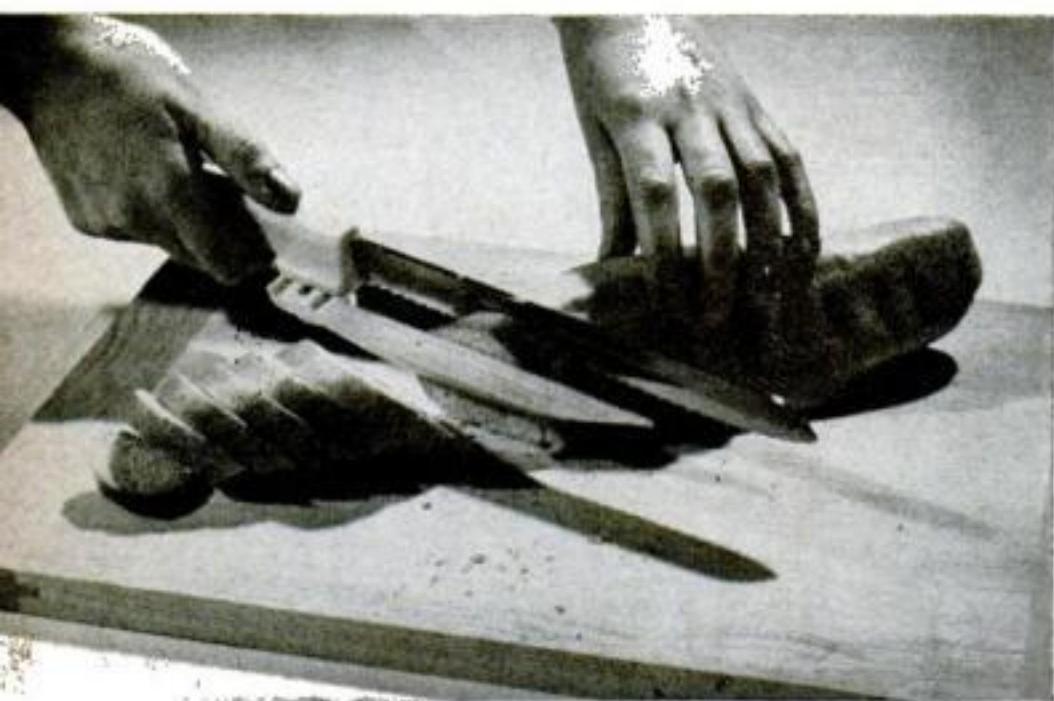


BITS WITH A LONG BITE: These carbide-tipped masonry bits reach clear through a concrete-block wall. Super Tool Co. makes them 12", 18" or 24" long, in sizes from $\frac{1}{4}$ " to $1\frac{1}{2}$ ".

TO SET THIS SPEED CLAMP, you just slide up the bolt, spin back a lock nut and give a quick turn to tighten it. Clamps, made by Larson, come 3" to 9" long, plus 21" extension links.

DELICATE "FEEL" guides pressure on tiny drill bits with this fingertip feed accessory for lathes and drill presses. Bits won't break, stay sharp longer, says Hunter Tool Co.

What's New (continued)



"CALIBRATED" KNIFE enables you to slice bread, meat, cheese and other foods to the exact thickness you want. The sliding guide bar can be adjusted from $1/16$ " to $1/2$ ". Price is about \$5 from Efficiency Kitchen Utensils Co.

chuck. Made by Kindt-Collins, it uses three high-speed cutters pivoted to avoid grabbing and kickback . . . For easy measuring of pipe and fittings, M. & E. Manufacturing Co. makes a Pipe-O-Meter gauge that has marked projections and scales for determining both inside and outside sizes of pipe from $1/8$ " to $1\frac{1}{2}$ ".

for more information:

Here's where to write if you can't get any item listed: American Machine & Tool Co., Royersford, Pa.; Ansul Chemical Co., Marinette, Wis.; Bear Mfg. Co., Rock Island, Ill.; Bendix Mouldings, 192 Lexington Ave., NYC; Boteo, 14 Gorham Ave., Hamden, Conn.; Calgo Mfg. Co., 89 N. Santa Anita Ave., Pasadena, Cal.; Campro Products, Canton, Ohio; Colorado Fiberglass Corp., 4200 Madison St., Denver, Colo.; Deveon Corp., Danvers, Mass.; Efficiency Kitchen Utensils Co., 520 5th Ave., NYC; Ford Motor Co., American Rd., Dearborn, Mich.; Hacksaw Pruning Blade Co., 430 Ramsey, Fayetteville, N. C.; Hunter Tool, Box 564, Whittier, Cal.; Kindt-Collins Co., 12653 Elmwood Ave., Cleveland; Chas. O. Larson Co., Sterling, Ill.; M. & E. Mfg. Co., 72 Elm St., West Haven, Conn.; Plews Oiler, Inc., 701 S. 7th St., Minneapolis, Minn.; Ride-Eze Co., P. O. Box 87, Monroe, Wis.; Simoniz Co., 2100 Indiana Ave., Chicago; Stanley Works, 111 Elm St., New Britain, Conn.; Super Tool Co., 21650 Hoover Rd., Detroit; Walter Kidde & Co., Belleville, N. J.; Wright-Hall Products, 2190 Colorado Ave., Santa Monica, Cal.

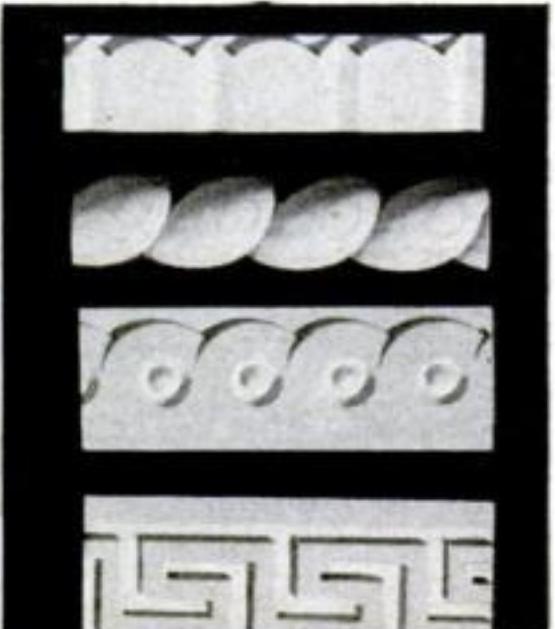
You're
a
Mason
(see
previous
page)



... because this is a new Stanley brick hammer. Replaceable plastic plug in the butt lets it tamp bricks without mashing the handle.

WOOD-CUTTING BLADE quickly converts an ordinary hacksaw frame for pruning tree limbs and sawing timbers up to 4". The 12" blade costs \$1 from Hacksaw Pruning Blade Co.

FANCY MOLDINGS, often hard to find, are now coming to hardware stores in 21 modern and classic styles. Bendix sells them in 4' lengths for about 35 cents to \$2.55 each.





Boats Borrow from Cars, Planes



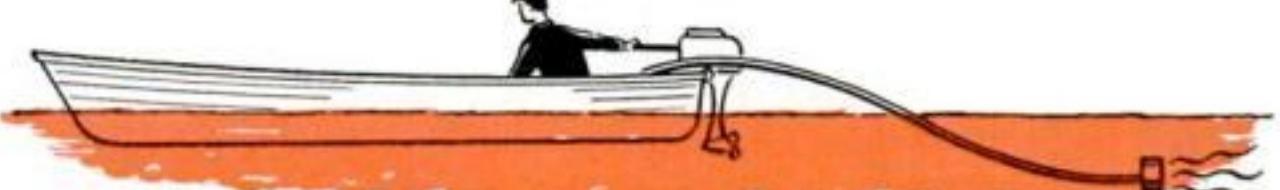
Car or boat? Deliberate automotive styling on this new high-speed runabout includes two sealed-beam headlamps for bright-lighting docks and tricky waters. The 15-foot unsinkable fiberglass Car-Aqua is priced at \$995 for the outboard

shown, \$2,995 for an inboard version powered by a 45-hp. vertical-shaft Fageol engine. The maker, Marine Plastics, 825 N.W. 8th Ave., Fort Lauderdale, Fla., promises four-eyed models soon. Yep, you even dim your lights for other boats.



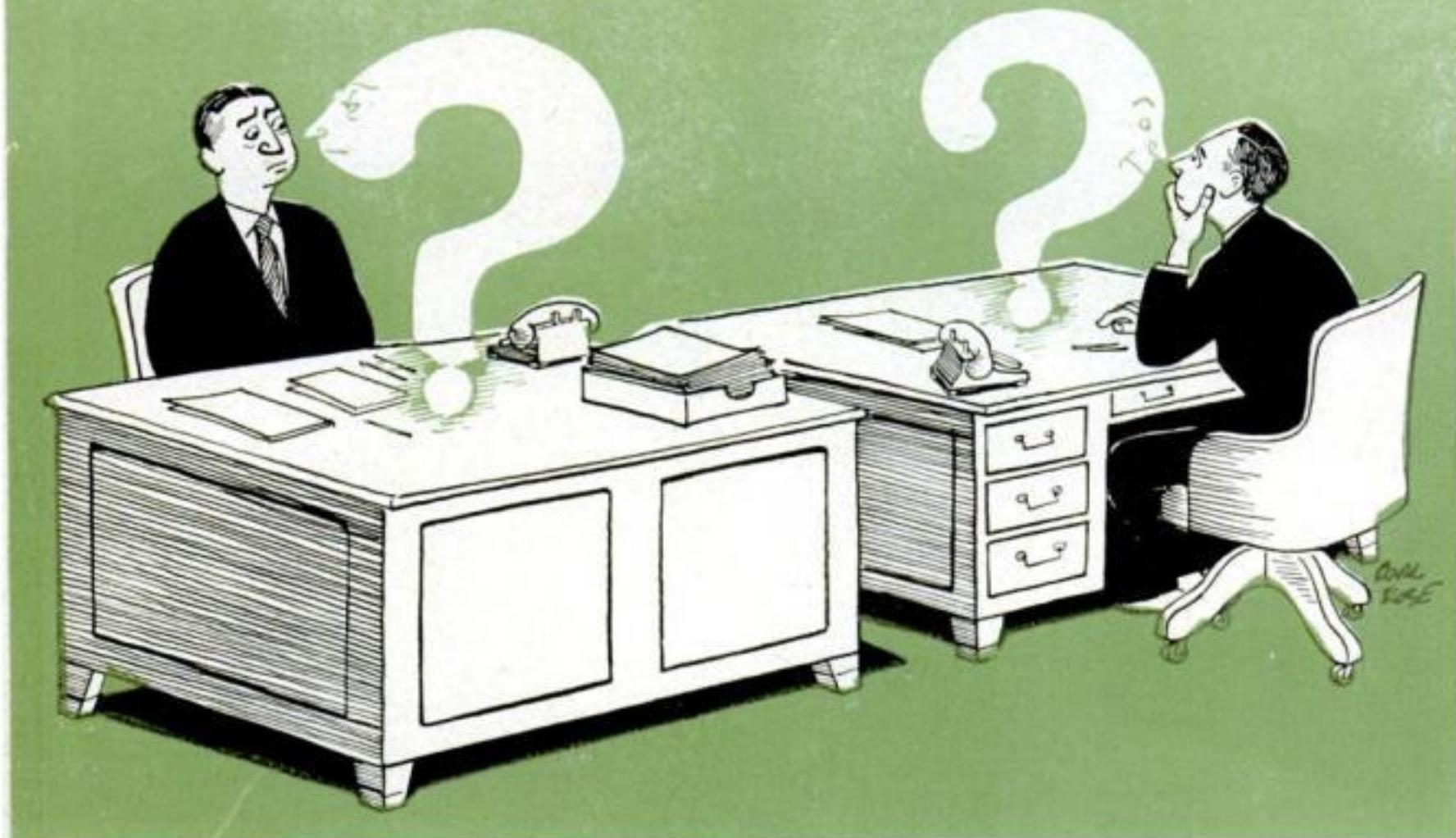
Style-it-yourself steering wheel lets you choose a full-round rim, at left, or one of the popular new three-quarter-round or butterfly-shaped aircraft-type wheels at right. The all-aluminum wheel can be quickly hacksawed to remove one or both half-rims without any loss in

strength. It's also said to be the first non-magnetic steerer; it won't affect a compass mounted near it. Nautalloy Products, Box 295, Auburn, N.Y., makes it in eight colors and in styles for 90- or 20-degree mounting to the dash. Prices are about \$17 to \$19.



Automatic bilge pump needs no power—you just drop it overboard and trail it behind you. Force of the water spins a small impeller that creates suction, drawing water from the boat. It can pump two gallons a minute at low speeds, will even bail slow-moving sailboats. Riverside Machine Shop, 154 S. Main St., Homer, N.Y., sells it for \$14.95.

What You Don't Know About Your Job



Current studies are turning up some odd facts about why you get ahead or get fired—and what you want most in your work

By John L. Springer

YOU may be a first-rate worker, but chances are there are many things you don't know about your job. Although most of us spend a large part of our lives working for someone else, many of the fixed notions we have about employment are false, according to recent research. For instance, consider how experts answer the questions below. Their findings often contradict widely held beliefs.

Is money the reason most people work hard?



Despite what you may think, a report by University of Minnesota researchers says no. In lower income groups, employees may work harder to achieve better living conditions. But as pay improves, raises become less of a spur.

Generally, researchers have found, the most ambitious employees want to feel important. This is often proved in striking ways. In many firms, a boss earns less per hour than the men he supervises. He gladly works overtime and weekends without pay because he gets the "big man" treatment during the week.

Is what you know the most important factor in success, or is it whom you know?



Surprisingly, it's neither. How you act—your personality—is the biggest key to success. Many large corporations test prospective employees and candidates for promotion to learn more about their personalities. The most prized quality: the ability to get along with other people. The tests are designed to reveal hidden behavior problems, fears, resentments, conservative or radical work patterns, and personality disorders that employees may think are carefully hidden.

Is inability to do the job the reason most employees get fired?



No; it's generally because they can't get along with the boss. The noted psychiatrist, Dr. William C. Menninger, estimates that from 60 to 80 percent of dismissals in industry are due to social incompetence; only about 20 to 40 percent to technical incompetence.

Moreover, there's often a "troubled personality" behind the employee who keeps goofing off on the job. The secretary who makes too many typing errors may be worried over a sick mother. The mechanic who fails to observe safety rules may be wondering how to cover his losses at the race track. Many large firms keep psychologists on tap full time to help employees over temporary personality hurdles.

Can a poor boy reach the top as easily today as in Horatio Alger's time?



Easier! A study by W. Lloyd Warner and James G. Abeglan of the University of Minnesota says that "mobility to the top" (meaning a poor boy's chance to succeed) has been steadily increasing for the last quarter century. The main reason for this trend is that having a college education is increasingly more important than having well-to-do parents. In one study, it was found that 75 percent of top corporation executives had attended college and 19 percent had done graduate work. All evidence indicates that this figure will rise in the future. And thanks to scholarships and other aids, more talented—but poor—youngsters go to college.

Sons of executives, professional men and other upper-bracket fathers have one advantage over less well-to-do competitors, however: If they have the qualifications to make good, they reach the top faster.

Are people who rise "from rags to riches" usually happy with success?

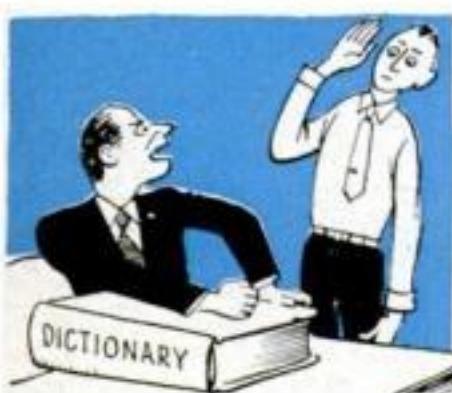


Two Yale sociologists—August B. Hollingshead and Fritz Redlich—investigated spectacular Horatio Alger stories and concluded flatly: "Any man who moves through two layers of society is destined to have a psychoneurosis." Dr. Redlich says that sometimes success results from a strong neurotic drive. Other experts have found that many executives strive to succeed because they can't stand even minor failures.

Sometimes, psychologists say, men reach the top in one profession because of characteristics that would be considered defects in another. For example, an attorney who suspects everyone probably can draw up an airtight legal contract. A large press association claims that it never takes

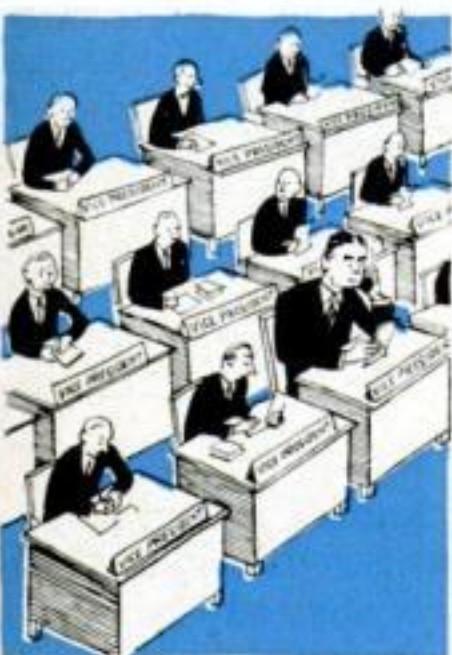
sides on public controversies but reports the news impartially; its executives often lack strong opinions.

What's the most important skill a boss should possess?



Since the development of complex big business, the typical boss has changed radically. He no longer need be an inventor like Henry Ford or a financial wizard like John D. Rockefeller. The modern executive's most important job is to tell others what things to do, and how to do them. Tests have shown that executives have one trait in common: They know how to use words to express themselves forcefully. For this reason, many experts state that every ambitious student should master English regardless of his field.

One corporation has 18 vice-presidents heading 18 different departments. Do all have an equal chance of becoming president?

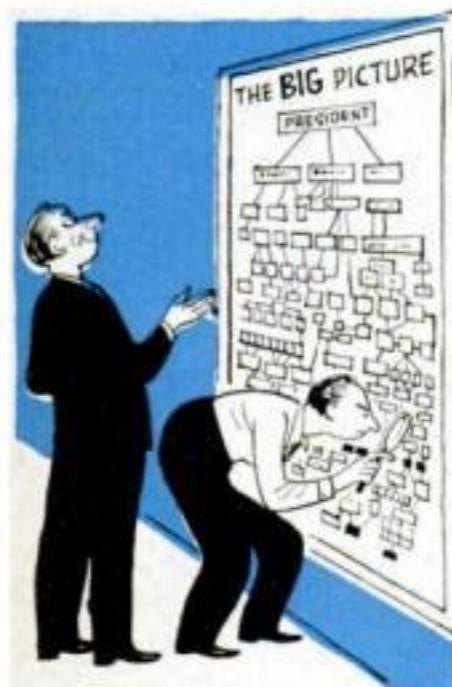


Definitely not. Just as major political parties usually select their presidential candidate from a state with a big electoral vote, most industries have definite patterns for promotion. For example, if in one company the president was formerly a sales manager, chances are that his successor will have a sales background, too.

A few decades ago, operations and production men or general-management men most often inherited the president's chair. Today sales, advertising and financial men most frequently forge ahead into top positions.

Incidentally, Episcopalians, Presbyterians and Congregationalists have a higher percentage of top executives in proportion to their numbers than other religious groups. Among the nation's top firms, there are no women or Negro presidents and only a few foreign-born ones.

Can you best get ahead by concentrating on your own job and doing it well?



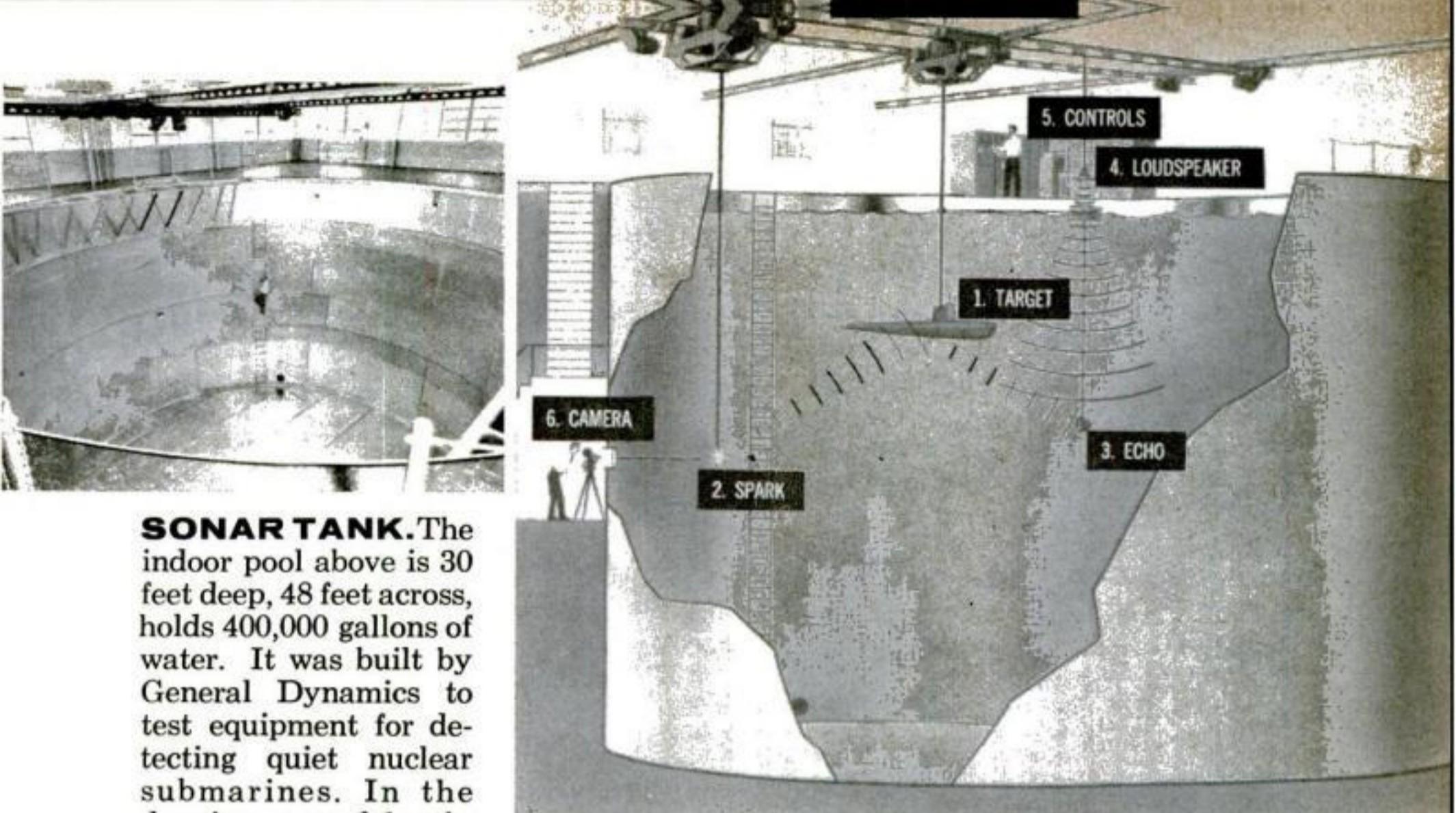
This was always advocated in the old books on how to succeed. But new research indicates that the man who does it may never get promoted. His bosses may reason that he does such a good job that no one could take his place. The best way to get ahead is to be able to do your boss's job, and to let the top brass know it. When an opening occurs up the line, you then will be able to step in.

Sticklers for detail often get stuck in a rut. Moreover, research by Henry D. Meyer and Glen L. Pressel, Chicago management counselors, indicates that top brass has considerably less ability to concentrate on details than do lower categories of workers. Employees who learn to see the "big picture"—and know how other parts of the company operate—usually advance faster than those who stick strictly to business within their own department.

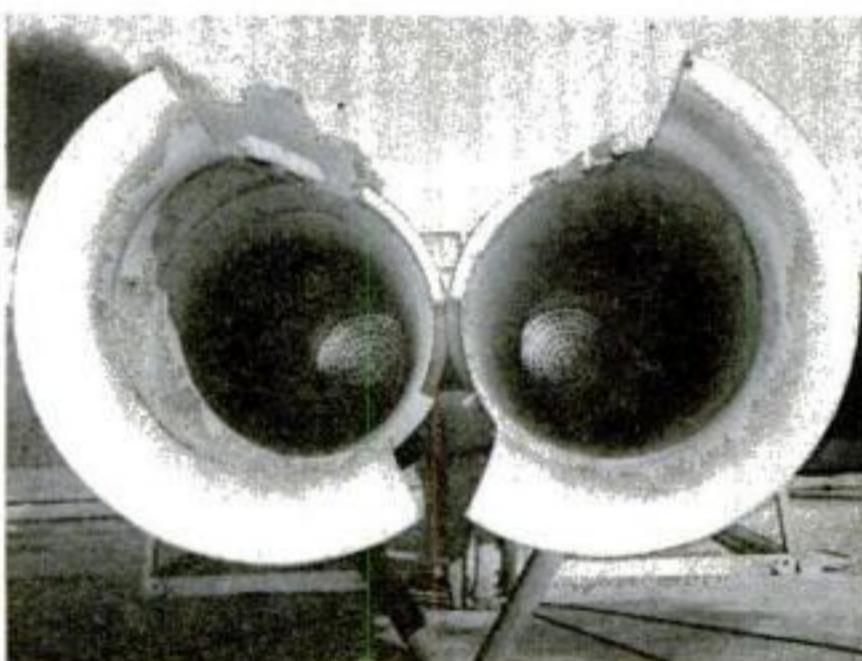
Is it true that a boss must learn to make important decisions quickly and then stick to them?

In the old days, most companies were run by one man. His word was law. Today, however, a typical top executive

[Continued on page 248]



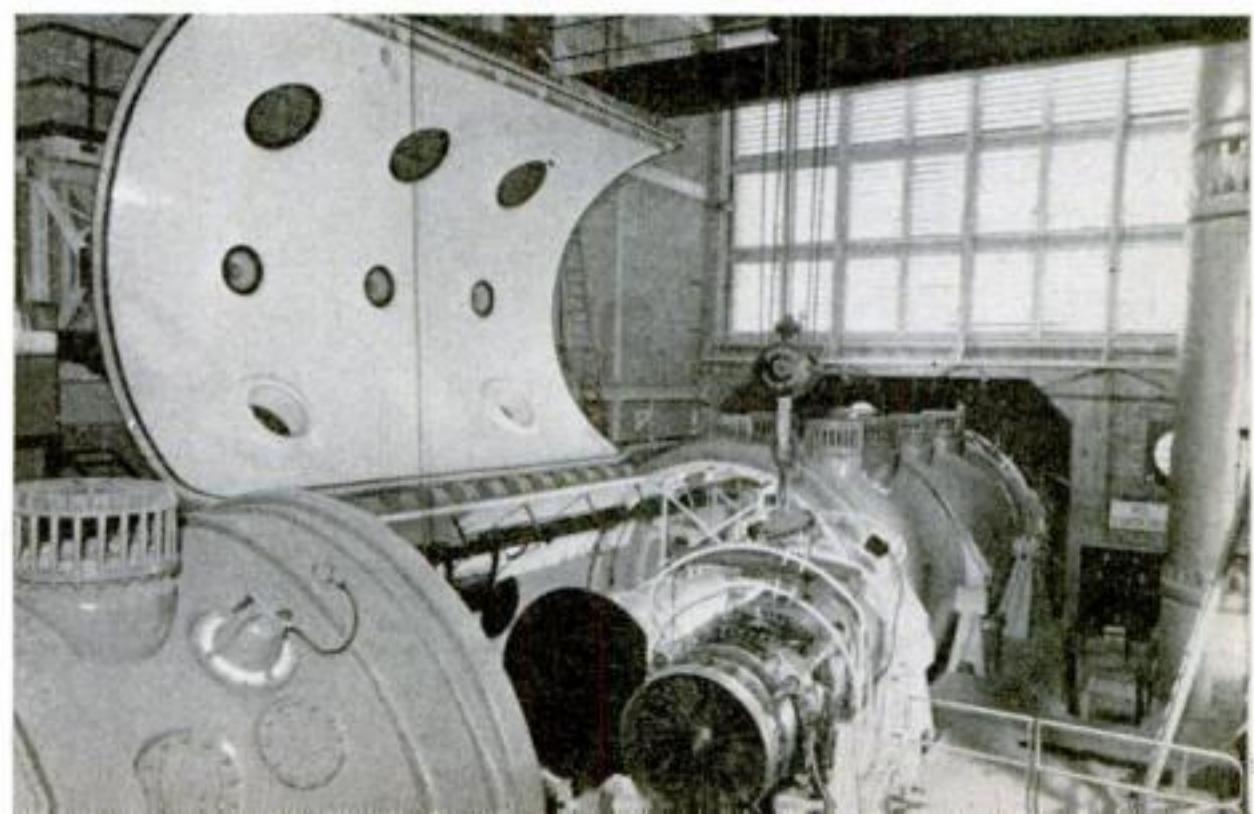
SONAR TANK. The indoor pool above is 30 feet deep, 48 feet across, holds 400,000 gallons of water. It was built by General Dynamics to test equipment for detecting quiet nuclear submarines. In the drawing a model submarine serves as a target (1) for a spark (2) bouncing off as an echo (3). A loudspeaker (4) tests air-water sound transmission; control is from the panel (5); high-speed photographs are taken through a port (6). Equipment is hung from a tram (7).



EAR MUFFS. Twin suppressors installed at Hill Air Force Base, Utah, reduced ground noise of dual-jet F-101s. The exhausts back into the baffle tubes.

FLYING HIGH.

Without leaving the ground, Rolls-Royce turbojet and turboprop engines are tested at altitudes up to 70,000 feet in this British chamber. At speeds up to Mach 2.5, coolers reduce temperature from 3,000 to 150 degrees.



AVALANCHE UMBRELLA. A roof covers the mountain highway at avalanche-prone danger spots near Zuers, Austria. Slides go over the roadway.



The Man Who Opened the Door to Space



professor from Worcester, Mass., who sought only peaceful scientific uses for his epochal inventions.

This month, 14 years after his death at 62, the entire U. S. missile industry will honor him at a conference.

"He was just as surely the father of modern rockets as the Wright brothers were of the airplane," Henry F. Guggenheim, noted patron of aeronautical research, has declared.

The Nazis developed their menacing V-2 rocket by helping themselves to ideas

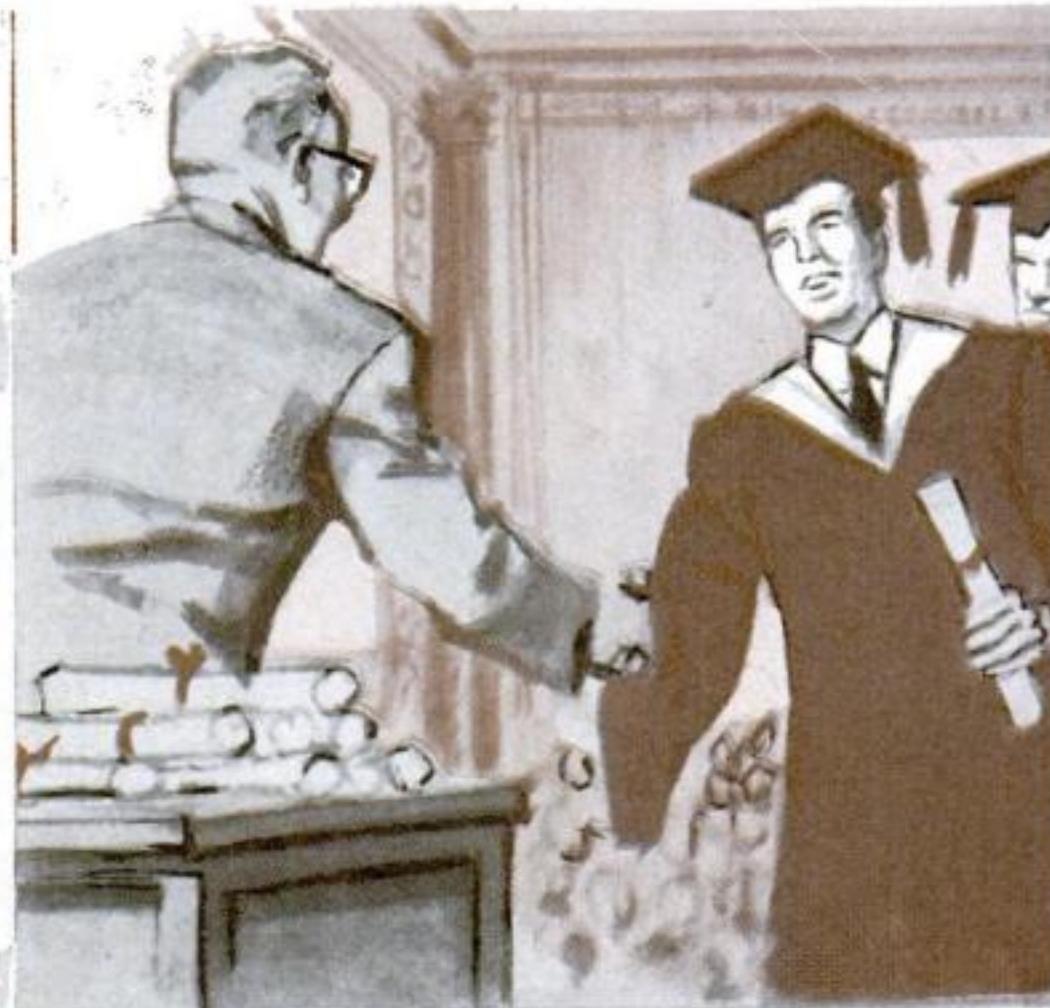
that Goddard had had years earlier and had painstakingly tested, usually with sparse funds, in obscurity. Goddard, however, had been bent upon finding a practical way to investigate outer space, not to deliver distant destruction.

Yet today's terrifying array of military missiles, as well as those hopefully dedicated to space exploration, owe their existence fundamentally to basic patents of his, some granted as early as 1914. It was Goddard who first devised a liquid-fuel rocket, a high-pressure pump to feed its fire, a combustion chamber and nozzle to give it maximum thrust, a cooling system to prevent its motor from consuming itself, and gyroscopic stabilization to keep the bird from flying wild.

The drawings beginning at right review his too short but immensely significant life.



STIRRING START At Worcester Polytechnic Institute, Massachusetts, which he entered in 1904, Goddard developed a consuming interest in rockets. In the basement of the physics lab, he applied his knack for mechanics and his scientific curiosity to the task of measuring the efficiency and power of firmly clamped skyrockets—and nearly smoked his fellow students out of the building.



A CAMPUS LION No solitary egghead, Goddard was president of his class at Worcester Tech, editor-in-chief of the college yearbook, and a fraternity man. But he graduated, in 1908, with highest honors in physics and mathematics. He began teaching at Clark University, also in Worcester. Graduate work at Princeton was interrupted in 1912 by a two-year bout with tuberculosis.



FACT-FANCIER

Skinny and sickly, young Robert was barred from a boy's usual strenuous activities. He turned to books of science, but also read with zest the fiction of H. G. Wells and Jules Verne, making stern marginal notes wherever he caught the authors being unscientific. One novel he especially liked was Verne's *From the Earth to the Moon*, in which rockets played a crucial role.



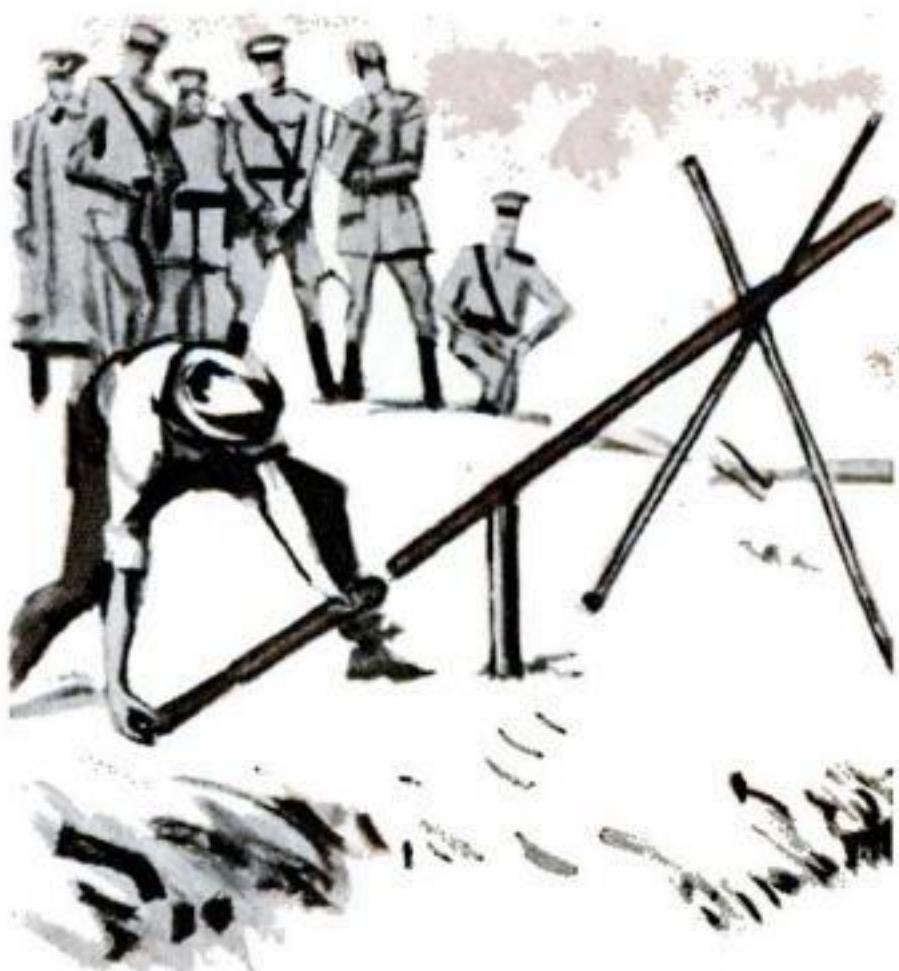
EXPERIMENTER

He built an aluminum balloon when he was 15 years old (1898), filled it with gas and expected it to rise to great heights. It didn't get off the ground. Then, foreshadowing a career in which his patience won out over many setbacks, he stoically accepted the "failor," as he spelled it, and turned to other investigations. One of these was a study of how birds fly.



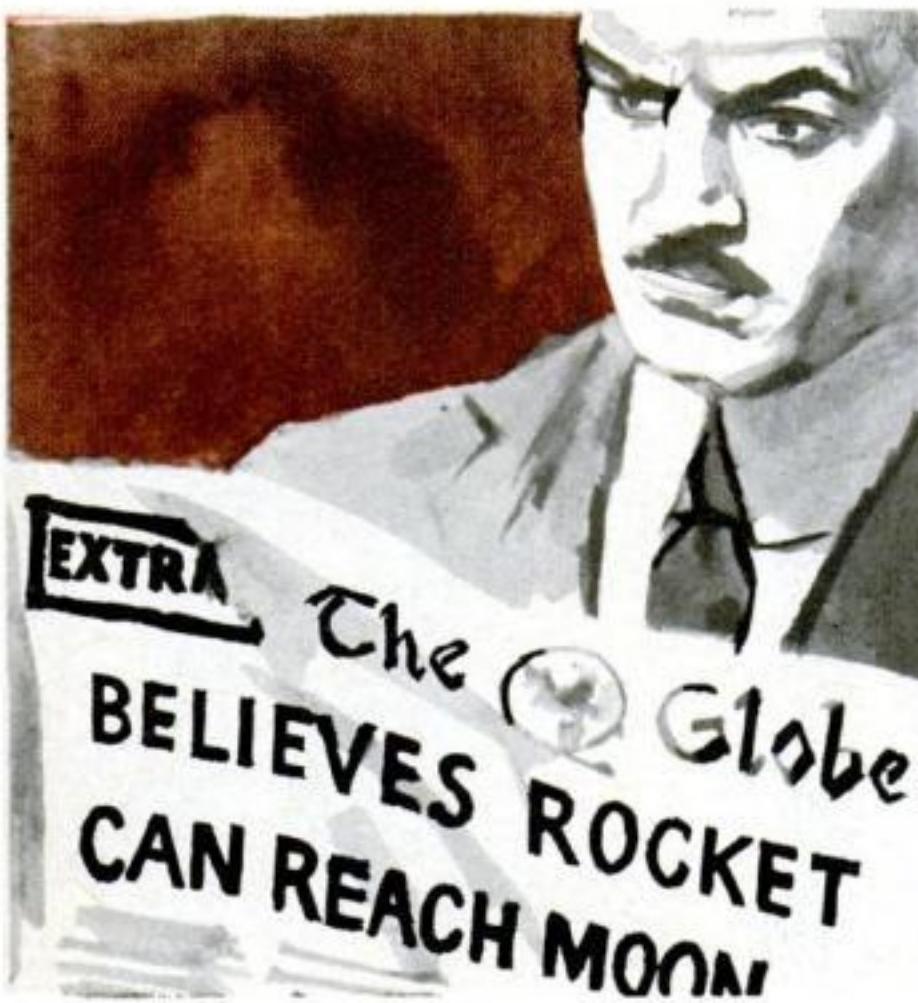
CRUCIAL TESTS

Back at Clark in 1914, he experimented with and patented a small steel combustion chamber to which he could fit nozzles of various sizes. With these he demonstrated that the efficiency of a rocket could be vastly improved. By showing that his creation worked even better in a vacuum, Goddard proved that rocket propulsion was feasible for flights in outer space.



WAR EFFORT

Early in 1917, the Smithsonian Institution granted Goddard \$5,000 to help finance his rocket research. Till then he had paid for it out of his meager salary. And when the U. S. entered World War I, he patriotically put his special knowledge to military use. He and associates developed an antitank rocket that was a forerunner of the bazooka. [Please turn the page.]



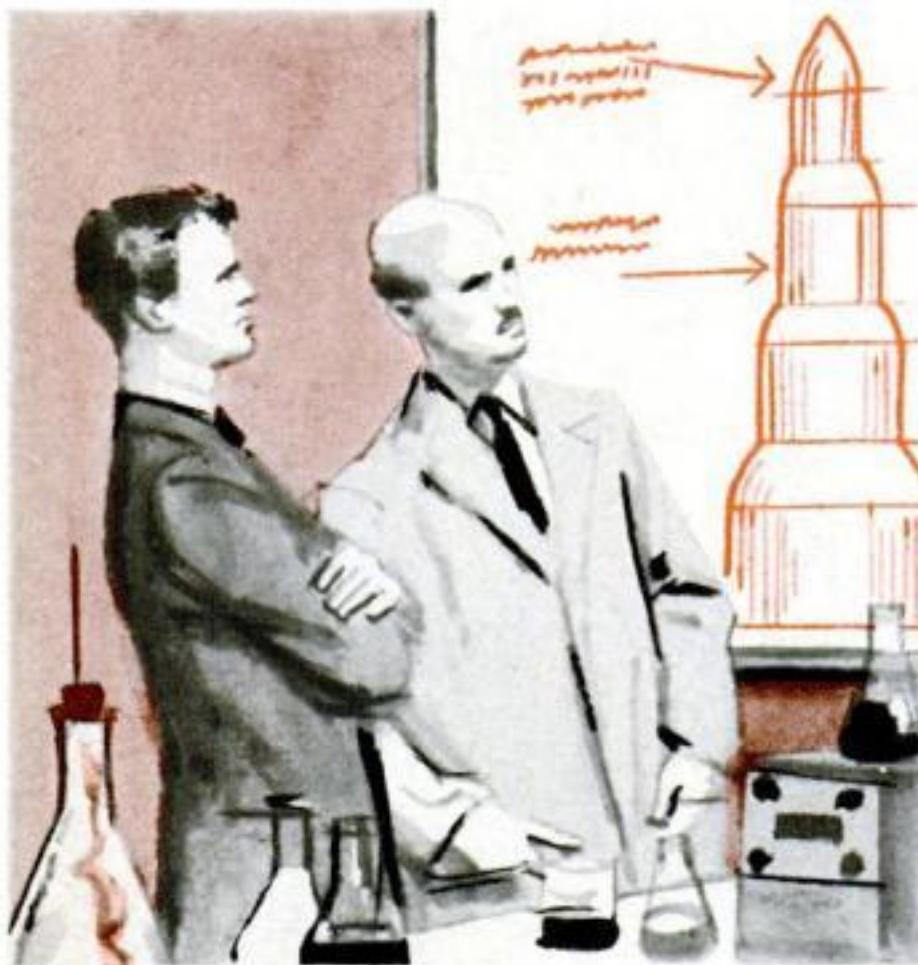
WILD STORIES

Goddard's pioneering treatise on rocketry, "A Method of Reaching Extreme Altitudes," written in 1919, was a sound, meticulous work. It did, however, contain his prediction that a rocket could be made capable of hitting the moon with a charge of magnesium powder. Certain newspaper stories distorted this and made fun of him. He became aloof except to intimates.



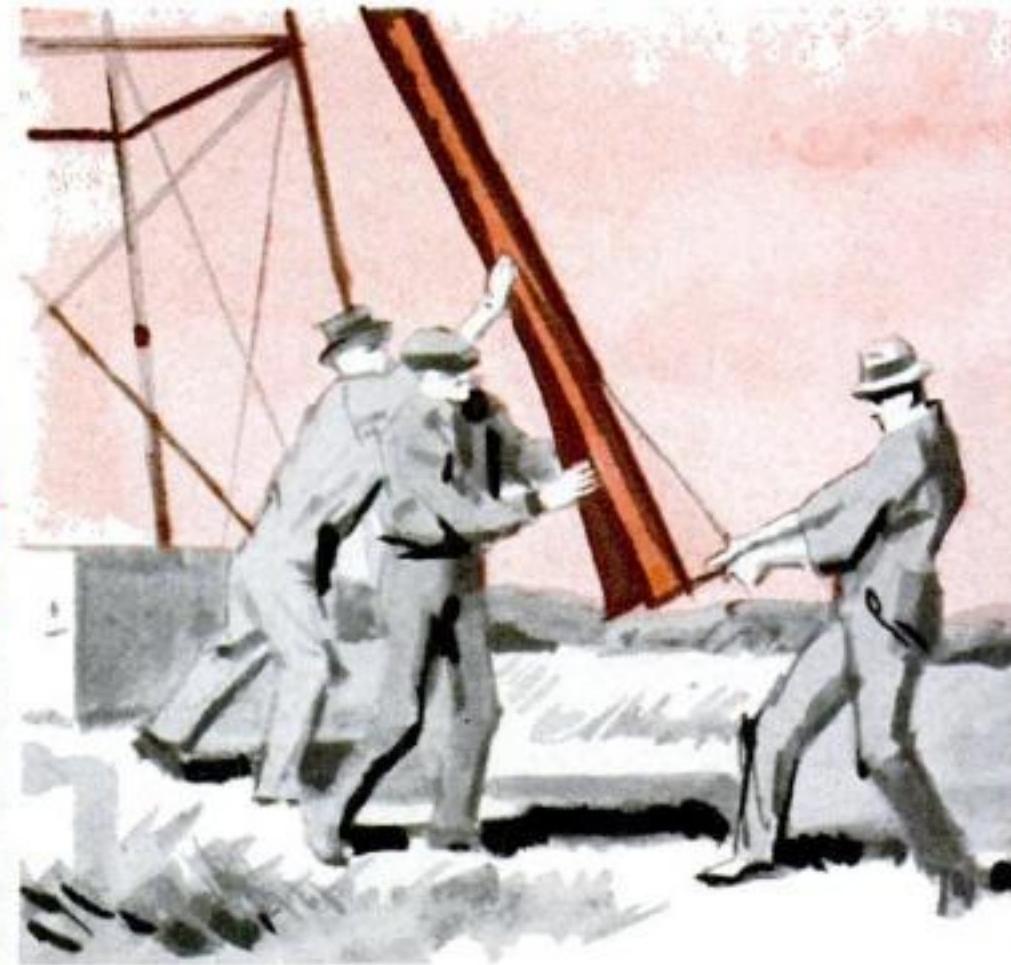
A FOREIGN FAN

Chance brought another great space-age pioneer, Germany's Hermann Oberth, in touch with Goddard. Unable to find a copy of Goddard's treatise at Heidelberg, where he was studying math, Oberth in 1922 wrote the American scientist for one (and got it). Oberth had envisioned a liquid-fuel rocket engine; he didn't know that Goddard was already testing one.



HELP ARRIVES

Public reaction to the notorious second rocket shoot at Auburn was largely unfavorable and discouraging. But young Col. Charles A. Lindbergh had read the stories with keen interest, came to visit Goddard and was much impressed. Lindbergh persuaded Daniel Guggenheim to finance Goddard to a two-year leave, workshop and test area in an empty part of New Mexico.



SELF-CONTROL

As slow but steady improvement in Goddard's liquid-fuel rockets led them to soar higher and higher above the desert near Roswell, N. M., the scientist saw he must find a way to stabilize them in flight. He devised gyroscopic controls, which worked steering vanes in the nozzle when a rocket started wobbling. Here the controls are being tested before a launching.



HISTORIC DAY

The first liquid-fuel rocket ever launched, a spindly, 10-foot creation of Goddard's, was fired from his aunt's farm in Auburn, Mass., on March 16, 1926. The little motor was up front, small tanks of gasoline and liquid oxygen at rear. Ignited by blowtorch, the rocket rose 41 feet, while Goddard's wife took moving pictures of it, as she did of all later experiments.

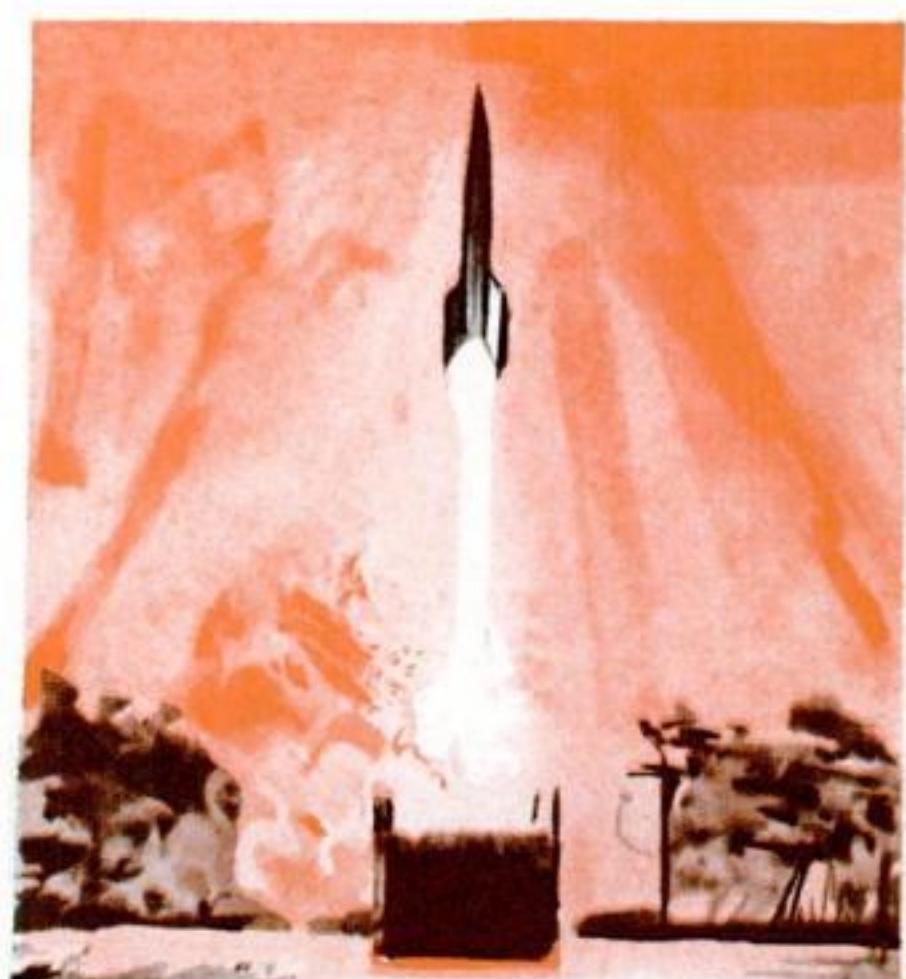
TOWN AROUSED

Such a racket resounded through Auburn on July 17, 1929, when Goddard launched a larger and better rocket, which rose 102 feet, that townspeople thought a plane had crashed. Fire engines, ambulances, police and a curious crowd converged on Goddard and his crew. He was told to stop firing rockets in Massachusetts, but the Army offered him an artillery range.



FIERY PORTENT

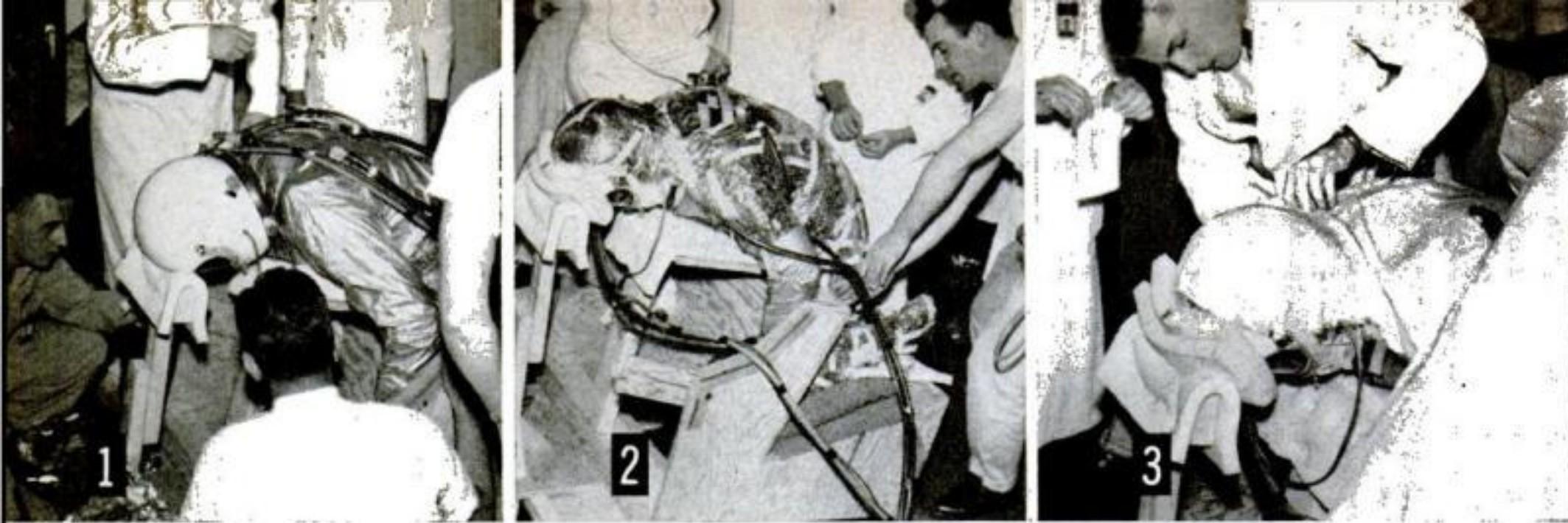
The most impressive demonstration of the possibilities of Goddard's long, lonely research came in May, 1935. While the professor watched from a shallow trench, protected by a concrete shield, one of his rockets shot 7,500 feet into the New Mexico sky and reached a speed of 700 m.p.h. Goddard returned to Clark and wrote a treatise on his work that is now celebrated.



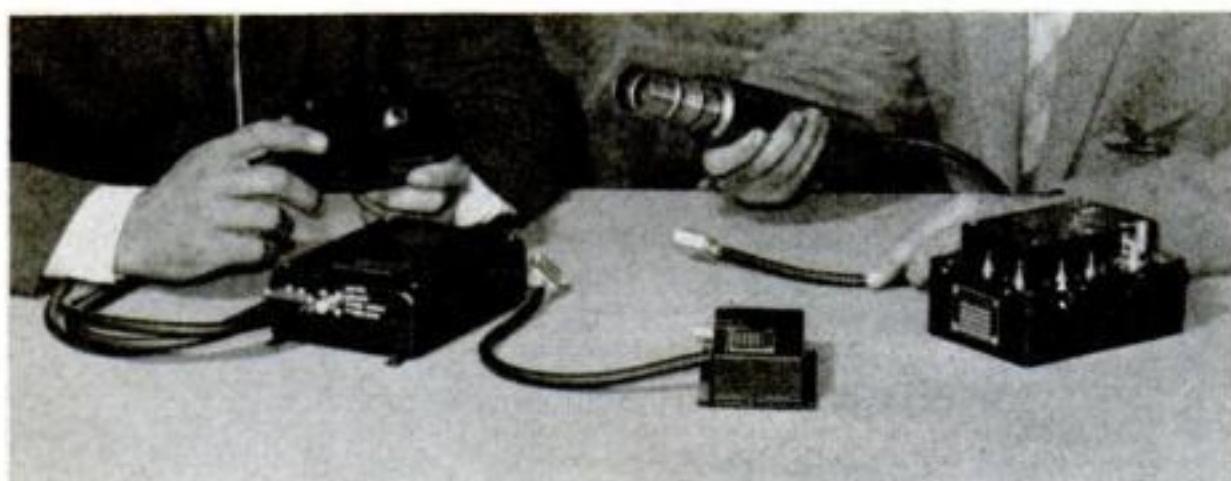
TRAGIC SHOCK

In 1944, shortly before the Nazis began firing deadly V-2s at England, one rocket crashed in Sweden. Parts were sent to an Annapolis lab where Goddard was doing research for the Navy. Sadly, he recognized that his brain child had been turned into a mass killer. A year later, in August, 1945, Goddard died. His weak lungs failed after a major operation.

END



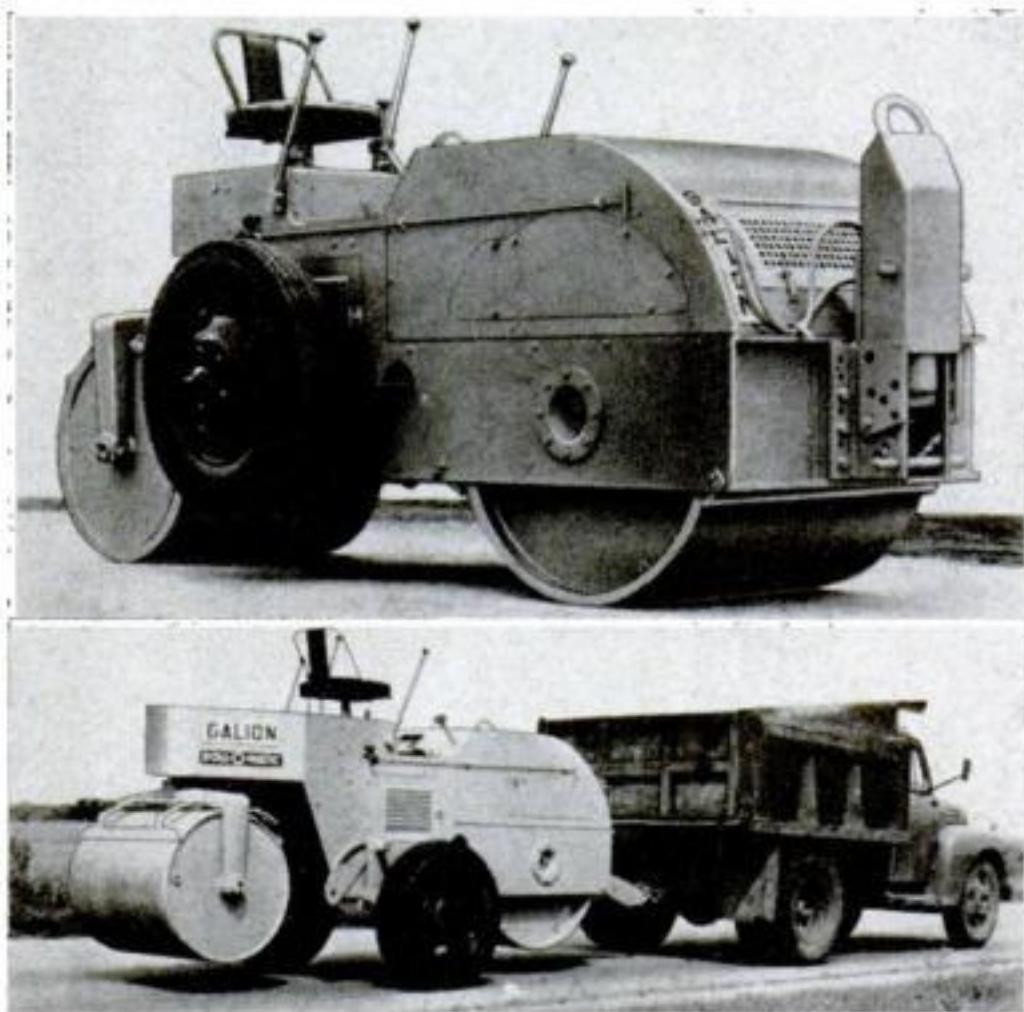
FORM-FITTING SPACE SEAT. Seats in space craft should be custom-built to fit the occupants, say General Electric engineers. So they came up with the seat-molding method shown above. Dressed in complete space suit, a pilot is placed in sitting position on a form, but with his back up (1), coated with taped aluminum foil (2) and spread with plaster



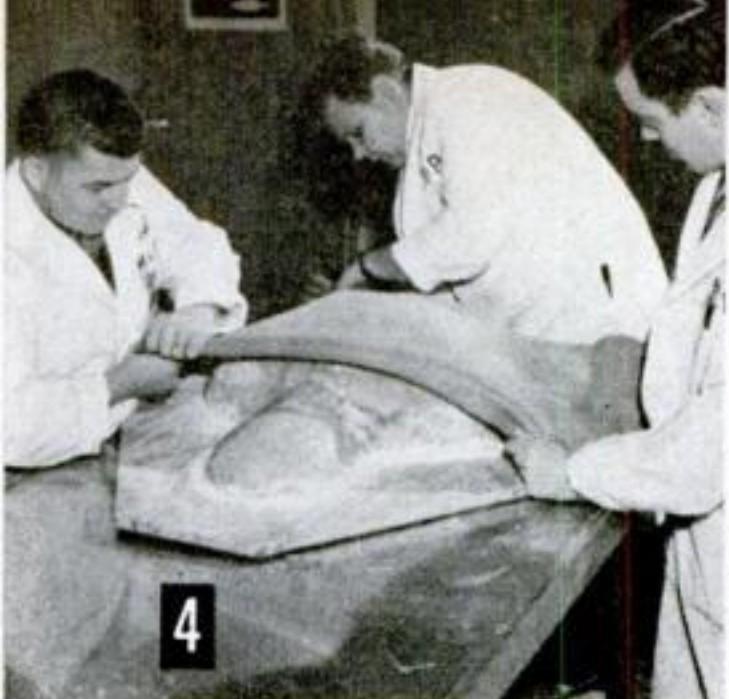
SATELLITE TV. A video camera $2\frac{1}{4}$ inches across and $7\frac{3}{4}$ long has been developed by Lockheed for viewing the earth from orbiting Army satellites. The camera is at left with battery, transmitter and control units.



HELMET RADIO. Here's a receiver worn under the shield of a motorcycle policeman's helmet. It was designed by Larry Smith, Atlantic City police technician.



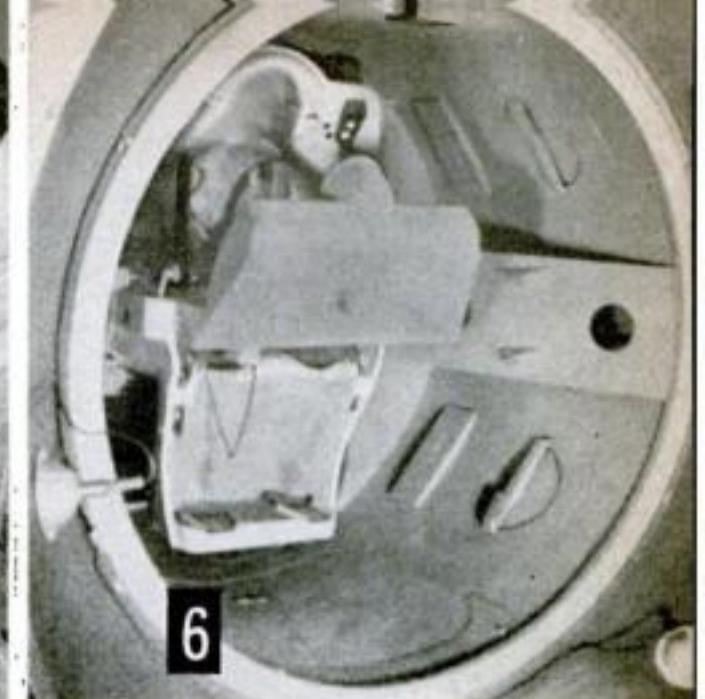
TOW-WHEELED ROLLER. Rubber-tired wheels on the road-surfacing machine above retract (top) when it packs and smooths pavement. Lowered (bottom), the big six-ton Galion roller can be pulled quickly by truck to another site.



4



5



6

casting from head to back of legs (3). When the cast hardens, it is removed, covered by rubber sheeting (4), set for an hour in a seat frame filled with polyurethane (5) which is allowed to cure two hours for strength. The seat is then installed on a rotating stand in a capsule mockup (6)—an individual fit conforming to the pilot's contours.



HIGH-RIDING MURAL. Work of itinerant signpainter Paul Hubbard, the fanciful art above adorns his car and advertises his skills. The 66-year-old "knight of the highway" winters in Ybor City, Fla., travels the rest of the year.



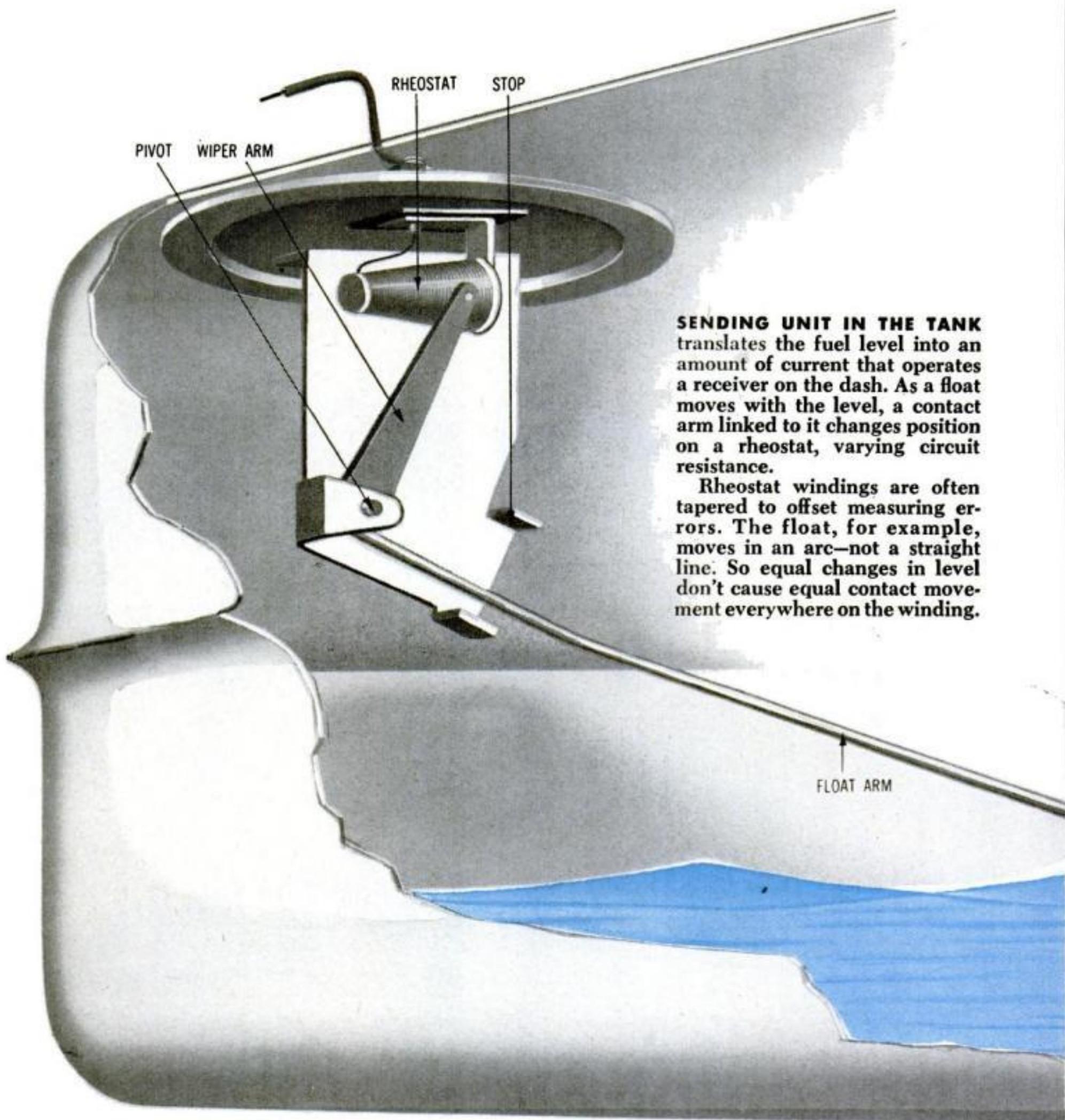
AIRFOIL BOOST. Outboard jets, retouched in on this C-130, will soon blow air over wings and tail of the Air Force transport. They will increase control at slow speed, shorten takeoff and landing.

THIEF CATCHER. A movie camera, hidden in ferns (just above) in a New York bank, records such things as a holdup (top photo) at the press of a button. It's made by Mosler Safe Co.

How a Car's Gas

ACLEVER little telegraph system in your car sends you the word on how much fuel is left. It uses a "sender" in the tank and a "receiver" on the instrument panel. A single wire joins them, with the metal car chassis acting as the other connection in the circuit.

Nowadays all senders work alike: A pivoted float riding on top of the fuel varies the setting of a rheostat. The gas level in the tank thus governs the amount of current flowing in the circuit. On some cars, the sender is wired so that the more fuel there is the more juice flows. Others



SENDING UNIT IN THE TANK translates the fuel level into an amount of current that operates a receiver on the dash. As a float moves with the level, a contact arm linked to it changes position on a rheostat, varying circuit resistance.

Rheostat windings are often tapered to offset measuring errors. The float, for example, moves in an arc—not a straight line. So equal changes in level don't cause equal contact movement everywhere on the winding.

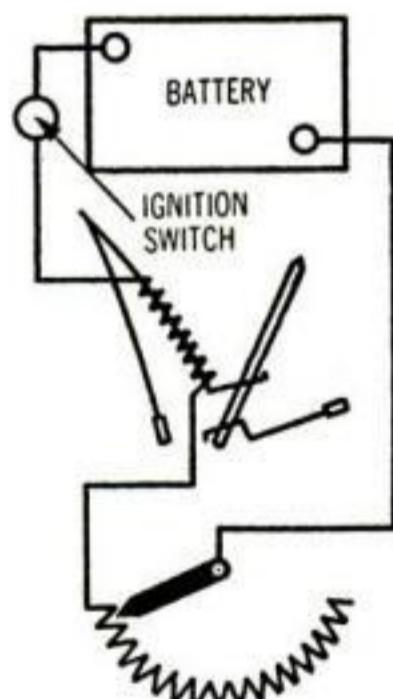
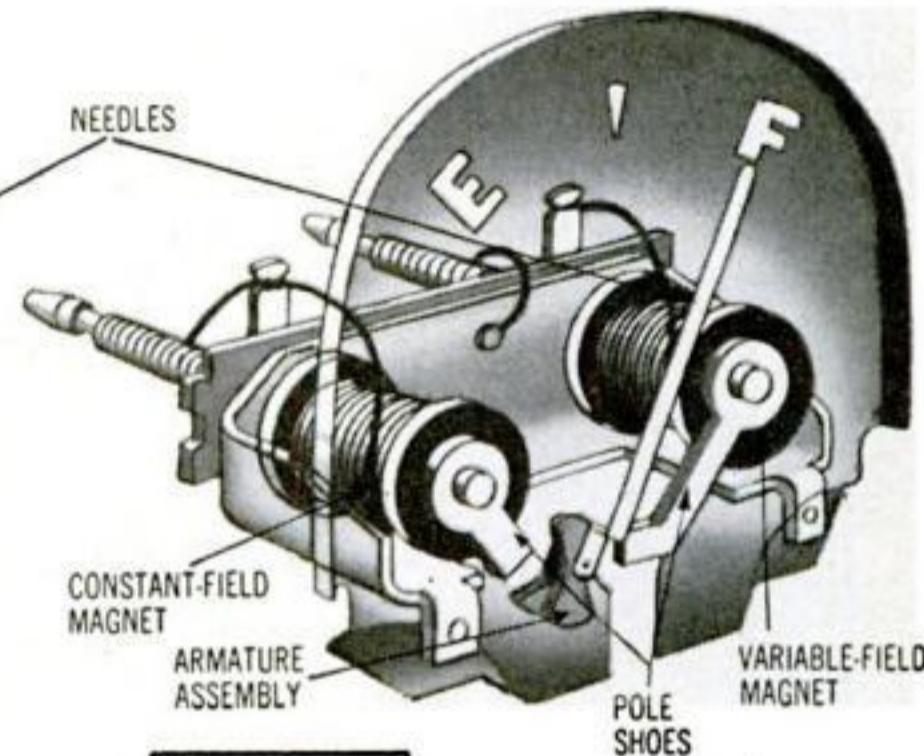
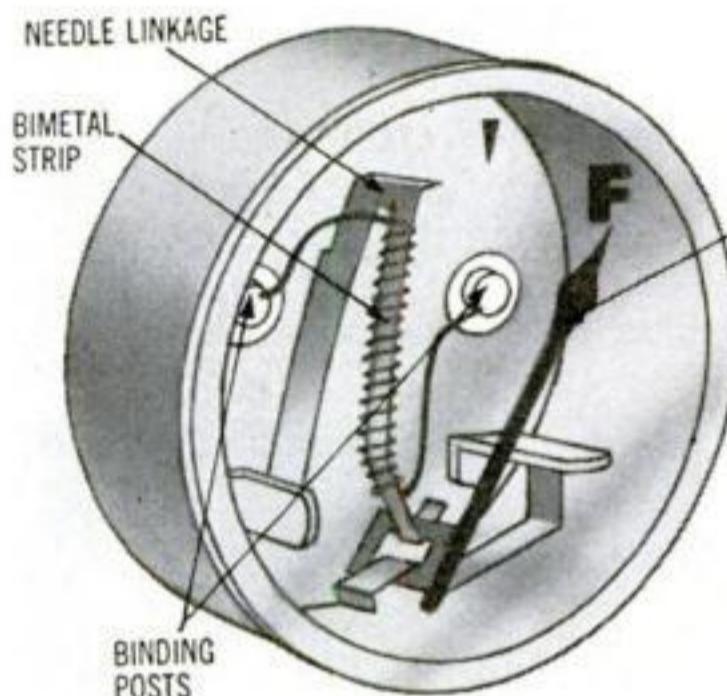
Gauge Works

are hooked up so that more fuel causes less current to flow.

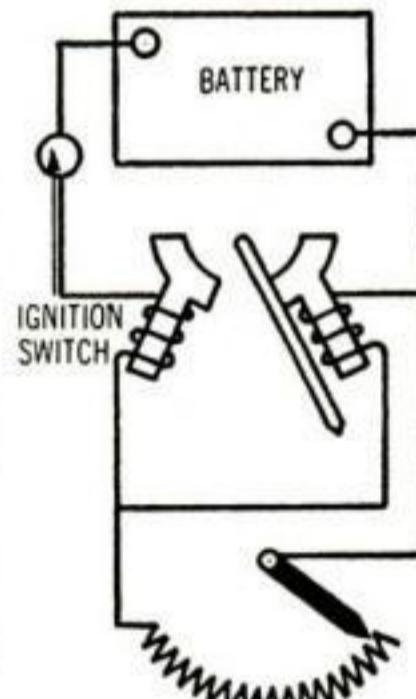
The receiver on the dash may be a thermal or a magnetic type. A thermal unit converts current to heat, which bends a bimetallic arm connected to the dial pointer. A magnetic receiver sets

up a continuing tug of war between two coils, with the outcome deciding where the needle will point.

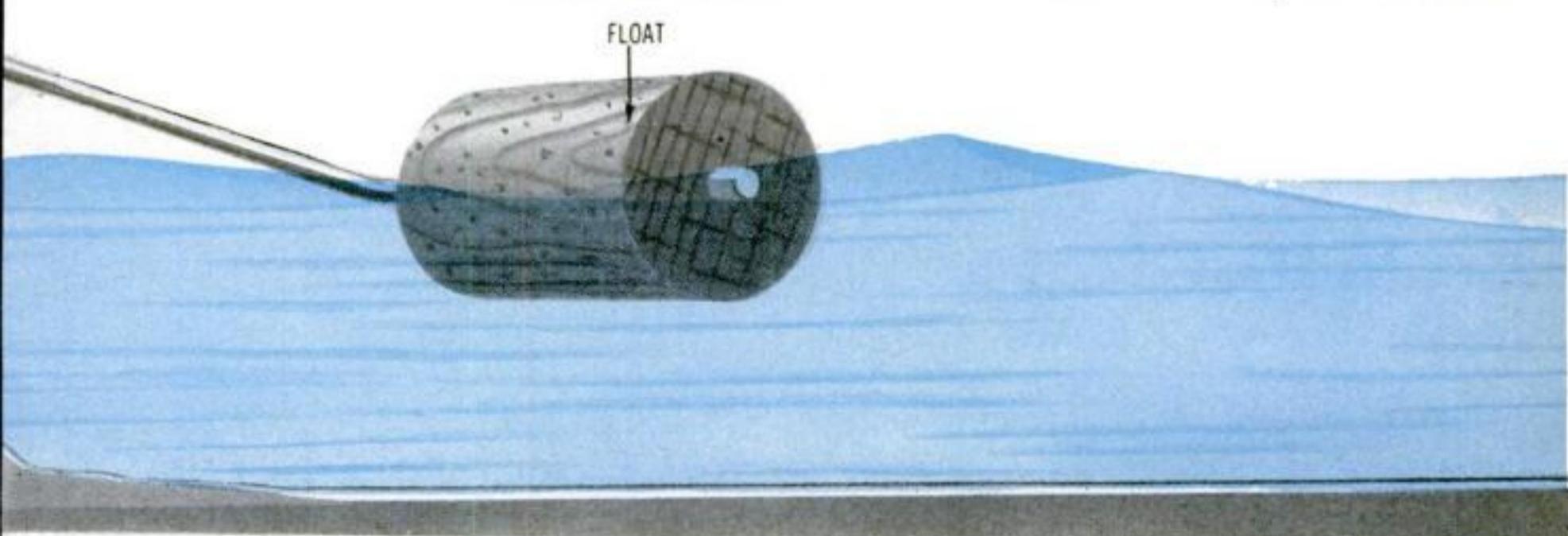
Most gasoline gauges are adjusted at the factory to register Empty when there is still a little mileage left. But don't count on it.—*Erik H. Arctander*.

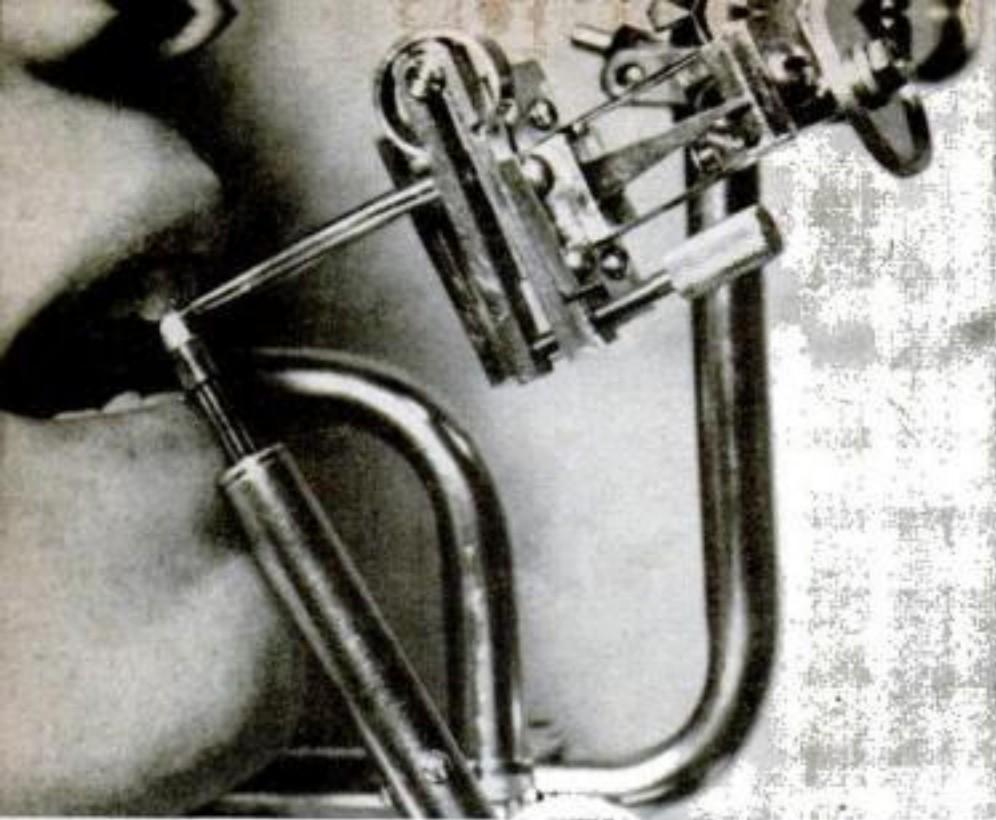


THERMAL RECEIVER has a bimetal strip with resistance wire wound around it. The strip remains straight until current flow produces heat in the wire. Then the strip slowly bends in proportion to the amount of current. It pivots an indicator needle through a simple linkage. In the series circuit shown here, a minimum resistance in the sender produces a maximum current.

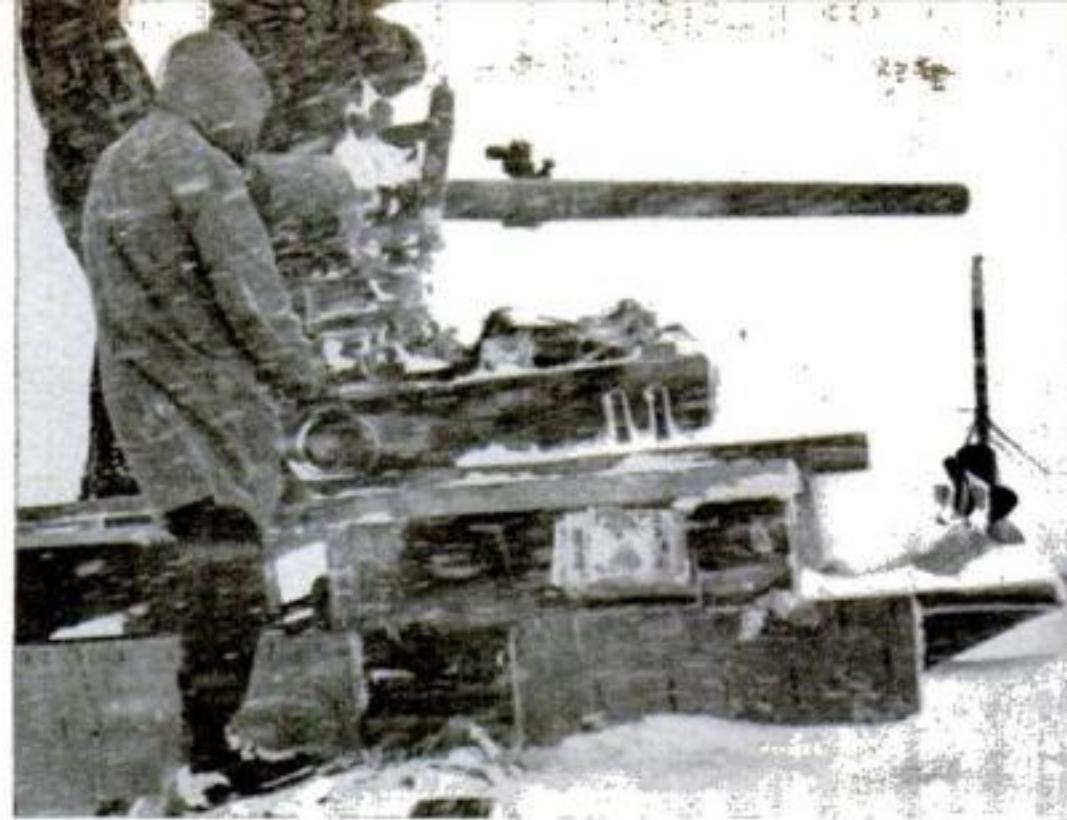


MAGNETIC RECEIVER has two coils, positioned and wired to fight each other. Both attract a pivoted armature attached to the needle. One coil is fed a fixed amount of current. The other gets an amount that varies with fuel level. Current in this coil changes with resistance in sender, which is shunted across it. Shunt hookup causes highest current with highest resistance.

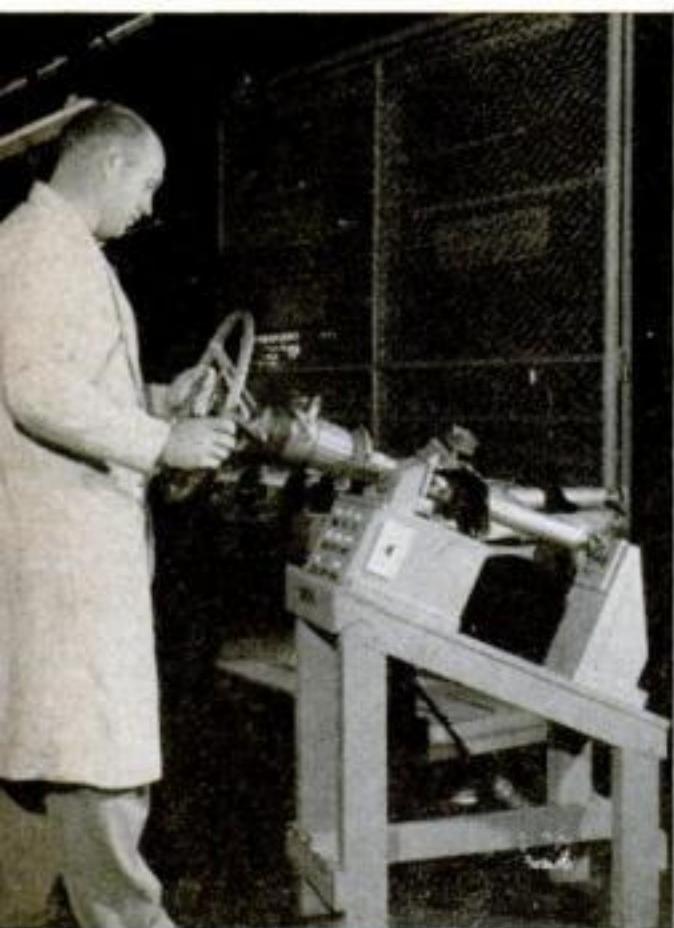




TOOTH ODOMETER. The distance a tooth will move in your head is measured by this instrument. It was designed by researchers for health studies. It spots movement of one 200-millionth of an inch.



SNOW CANNON. A 105-mm. rifle tops a peak in a California national park. Such guns are fired several hours daily during heavy snow season to help break up large snow packs and prevent avalanches.



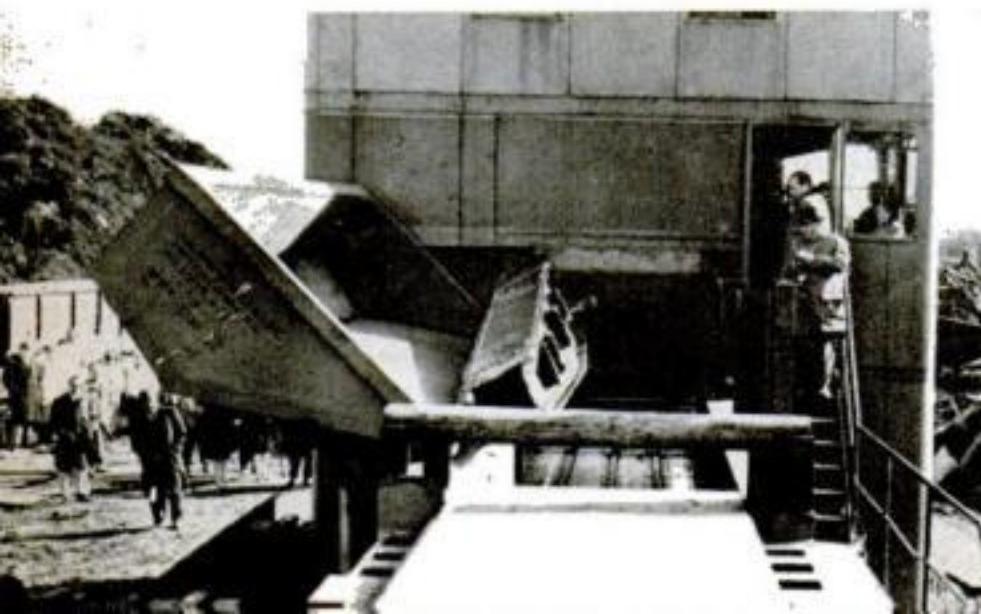
FREE-WHEELING. The Mercury inspector above spends a lot of time getting no place behind a steering wheel. He is checking electrical operations in columns received from a supplier.



BIG OCTAGON. The world's largest office building—2,400,000 square feet on 55 floors—will span the tracks behind New York's Grand Central Terminal. Completion is set for 1962.



ALL DRESSED UP. A hermit crab takes an underwater stroll here in its latest finery—a bright sea anemone. The plant-like creature attaches itself to shellfish, gets a lift to see the world.

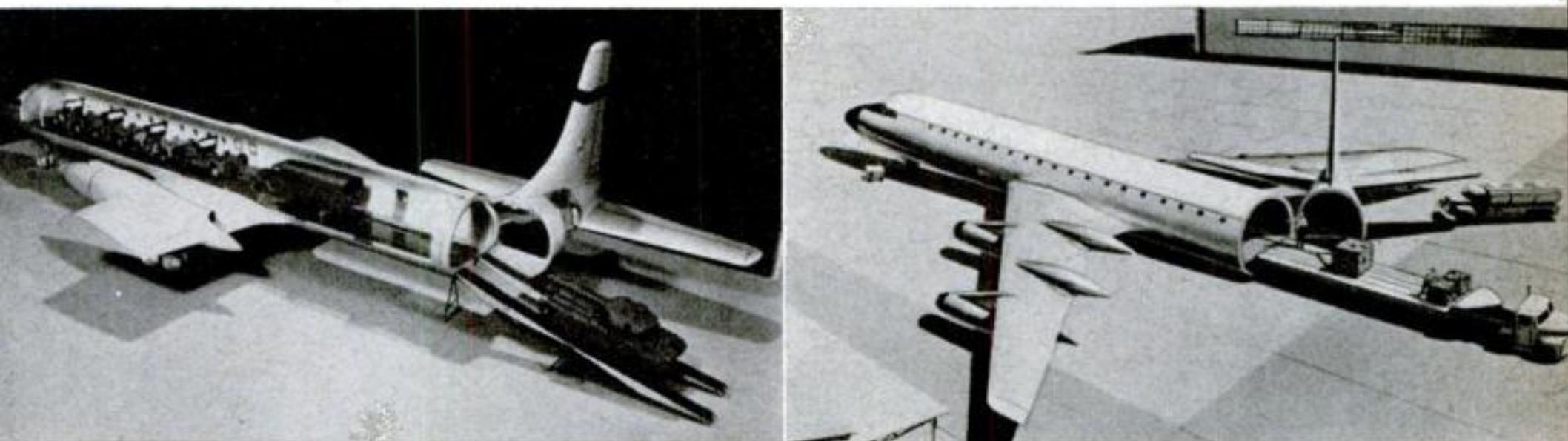
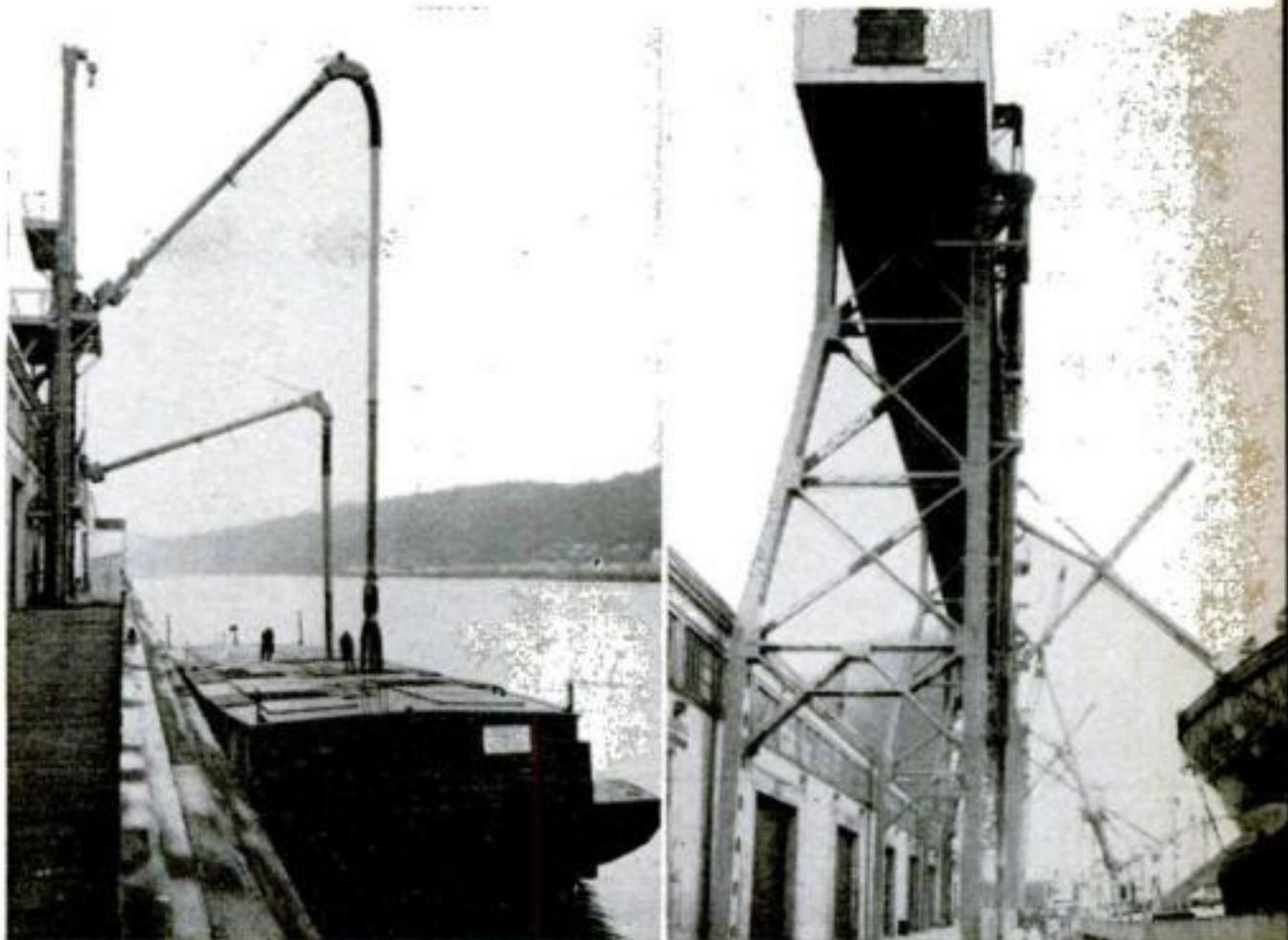


SHEAR MIGHT. Scrap metal dumped automatically into the trough of this 800-ton hydraulic shear comes out cut to specified lengths for steel mills. Shown here gulping a railroad-car underframe, it was built in Germany, reassembled by S. Blumberg & Sons, Philadelphia.

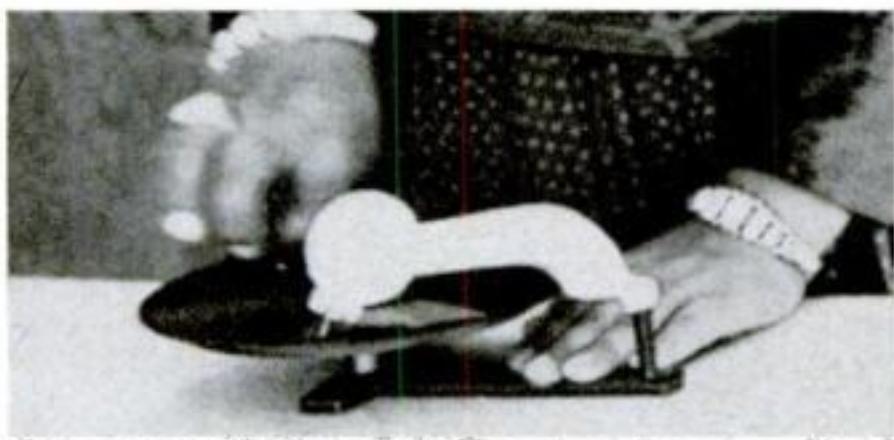
SPEED-UP. With loading capacity doubled and unloading tripled, a modernized 8,000,000-bushel grain terminal has been put into operation by Cargill, Inc., at Portland, Ore.

The twin high-speed pneumatic sucking tubes at right unload barges at the rate of 14,000 bushels an hour.

New shipping gallery (far right) pours 50,000 bushels of grain an hour into six holds of ocean-going vessels simultaneously. The big conveyor stands 75 feet above the dock, is 440 feet long.



SWING-TAIL PLANES. Two new transports with tail assemblies that swing all the way open to allow loading and unloading of bulky cargo are on the way. The Canadair CL-44 turboprop (left) will be built for the Canadian Air Force. At right is a cargo version of the Convair 600 jet airliner. Its landing gear will "kneel" to lower the fuselage.



FINGER POWER. Records on this little phonograph are spun by putting a finger in a slot in the seal area. It was invented by the Rev. Richard E. West, Denver director of the American Bible Society, to carry Biblical stories to American Indians in their own language.

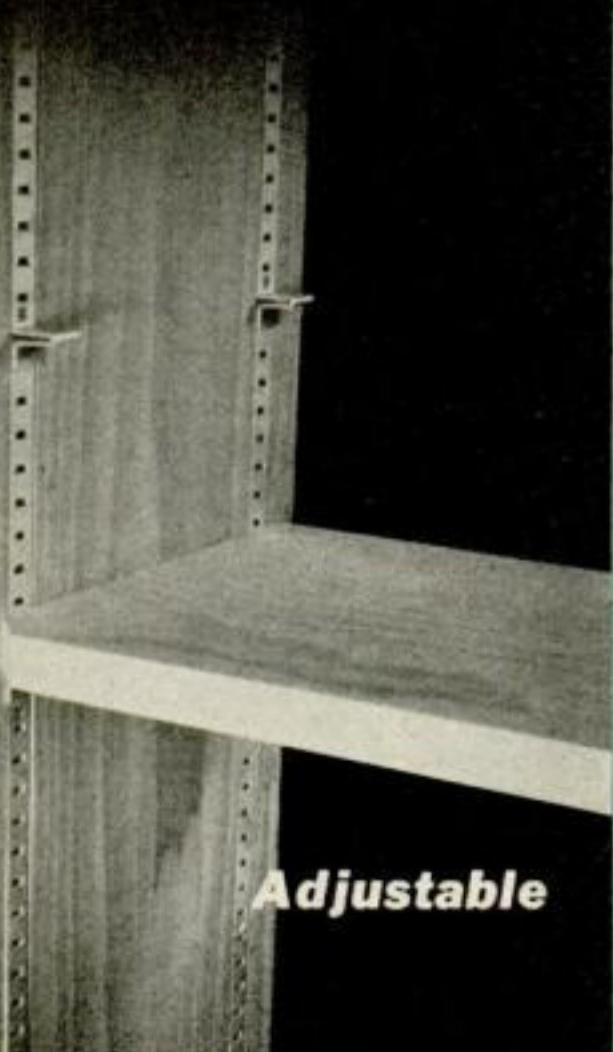


Space Saving

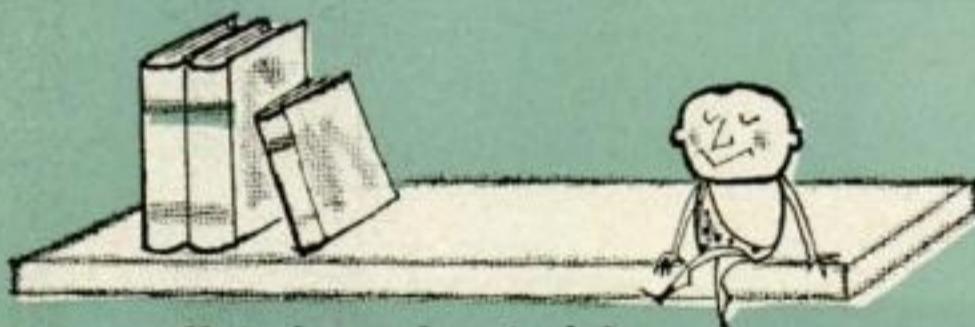
**MECHANICS
AND
HANDICRAFT**

*What the experts would
tell you about* **The
Fine Points
of Shelf
Building**

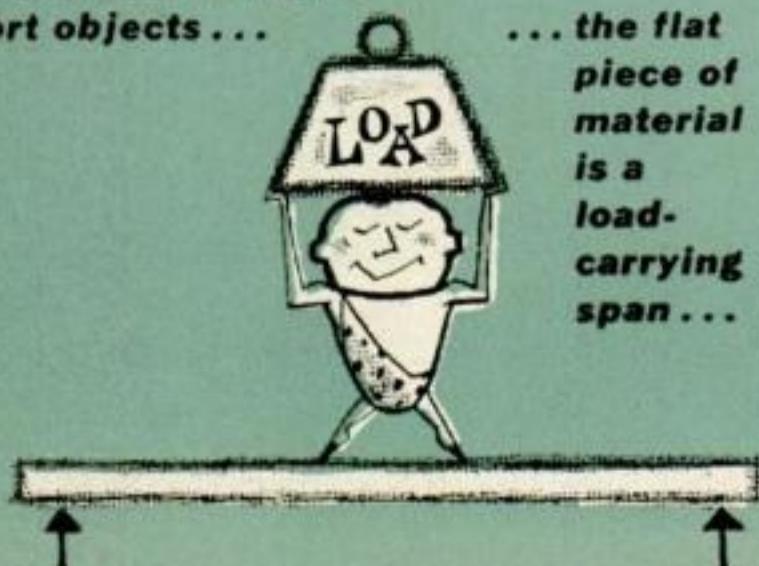
The Easy Way



A SHELF is



*... a flat piece of material
secured to a wall or frame
to support objects ...*



*... the flat
piece of
material
is a
load-
carrying
span ...*

By R. J. De Cristoforo

THE long and short, the fat and thin of all the things you save, store or display are little considered by the pros who put up your home. But when you add a shelf, think first of how you can get the most out of it.

The design you end up with may require more material, plus some extra time (two items the house builders waste a minimum of), but you'll be amazed at what you gain in space and convenience.

Never erect shelves unless you first consider the objects they will hold—even books. For the average novel, 8" is a good shelf depth (from front to back), but for some books you'll need 12". Book height should determine the space between shelves but don't forget to allow at least 2" for finger room. Spacing of 12" is enough for most books but some require more, some less. So book shelves should either be adjustable or designed to provide variation in shelf height. Visually, more widely spaced shelves look best at the bottom.

Do you want to put your record library on shelves? You have not only the problem of building shelves to take your present collection; you must also predict what kinds of records you'll probably buy in the future. Will it be 12" classical L.P.s? Or smaller 78-r.p.m. pop records?

Variations such as these point up the value of considering what you are going to store or display before you start building shelves.

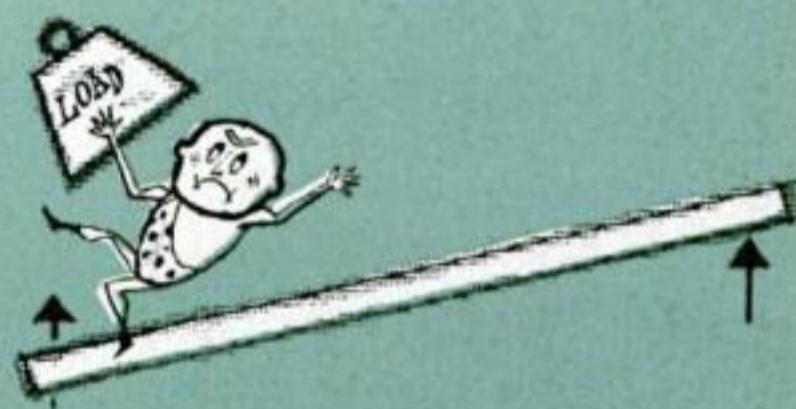
The materials to use. Ask a lumber dealer for book-shelf stock and he'll hand you wood a full 1 1/8" thick with smoothly rounded front edges. Nice material but expensive. The thickness lets you span a greater distance without sag. But if a 4' length of this stuff adequately supports a similar length of books, then a 4' length of 5/8" stock will do the same job if you provide additional support at the center. So, through design, you can control the stock requirements and save money.

Choice of wood is influenced by placement in the home and decor considerations. Shelves in the garage are usually prosaic. So strictly economy shelving does the job, and well. Economy shelving can also do the job in a closet. But where clothes might snag, you want smoother boards with fewer knots. Upgrading your material is not always for looks only—it may serve a functional purpose.

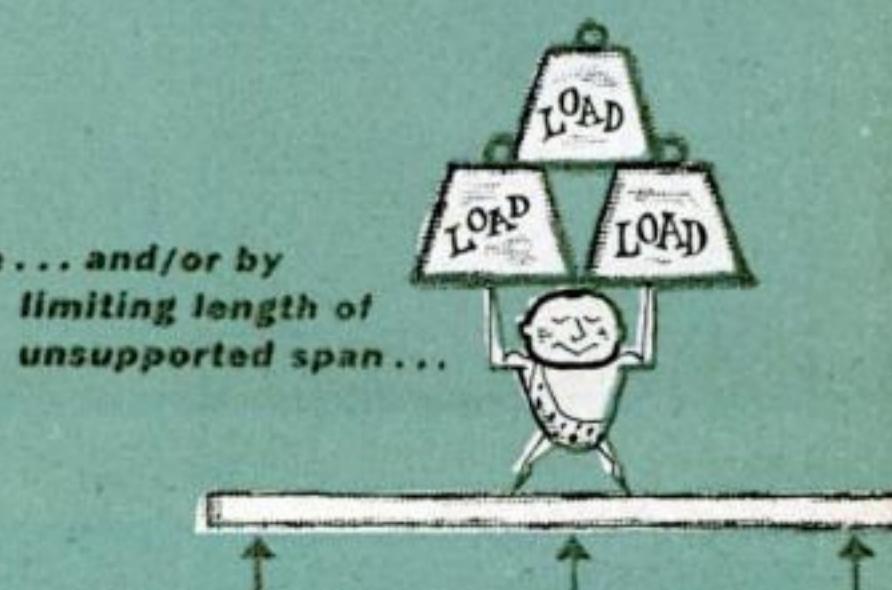
If shelves are exposed, or if you need to match the new unit to some existing furniture, you'll probably go to a fancier wood. Red and white oak, maple, birch, straight-grain fir, are stiff woods and can span greater distances than the softer woods. But if you provide support to limit the span, there is almost no limita-



...the load can cause deflection...



...even separation at the joint...

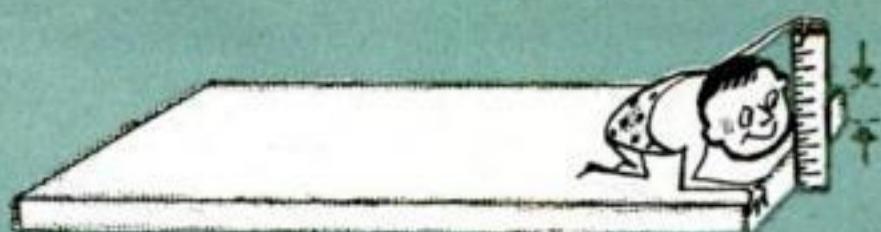


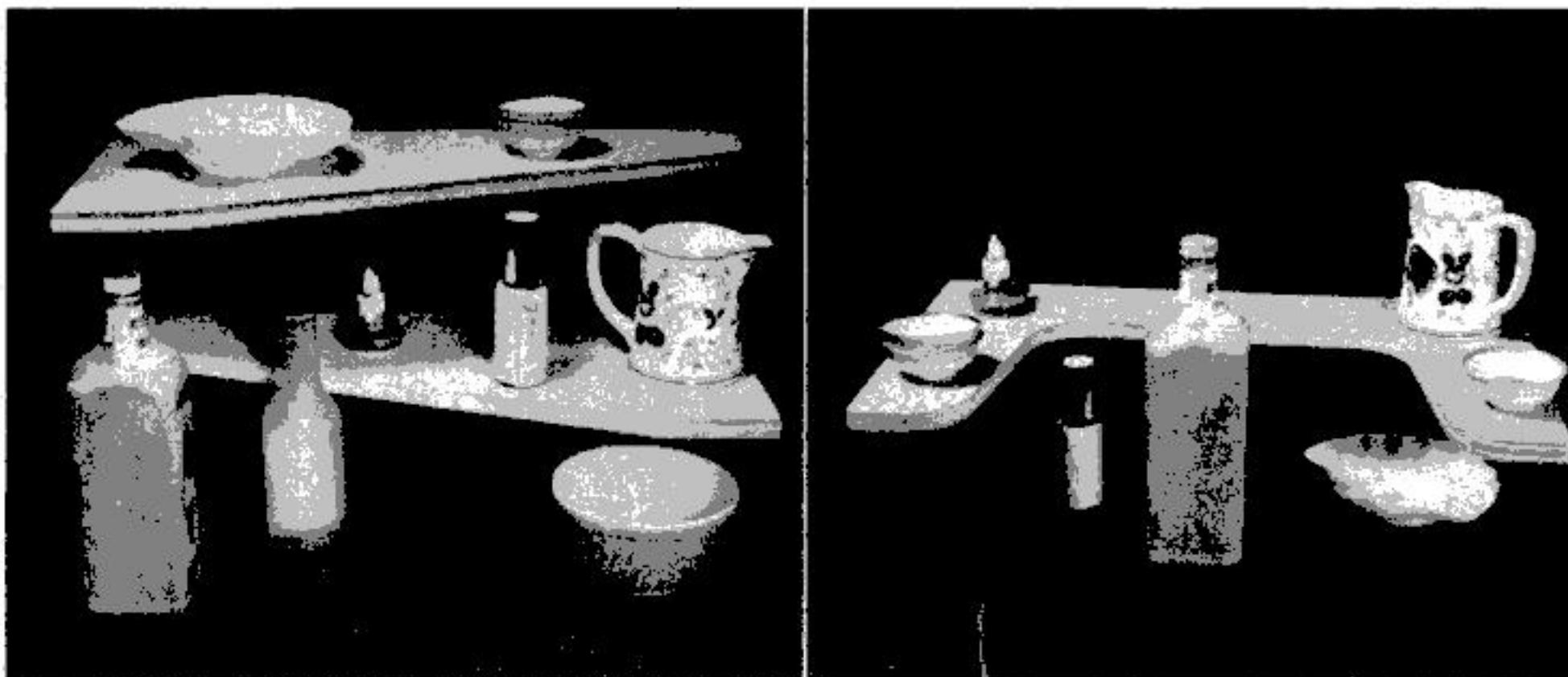
AVOID TROUBLE

by using adequate material in good size...

and/or by

limiting length of
unsupported span...





Maximum space—minimum material

SIMPLE SHELVES above are designed to offer compact storage space for objects of unlike shapes and sizes. Opposed triangles at left provide four different height levels, plus variable

shelf depth. The three-sided balcony shelf holds slim, tall or short items, leaving the center area for bigger objects. Both of these designs can be made free-standing by adding legs.

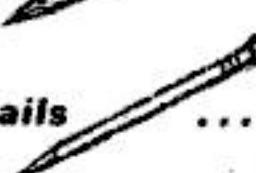
...and with adequate joint design. For example...

BUTT JOINT +



nails ... is easy, fast, good for short spans...

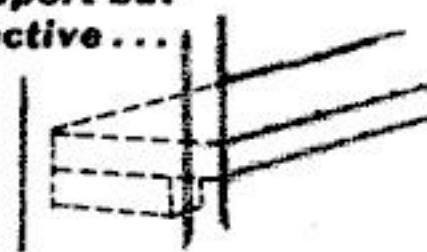
screws instead of nails



...won't add much strength since screw threads grip end grain...

...dowels are fine, require more careful work, more time...

CLEAT provides extra support but is unattractive...

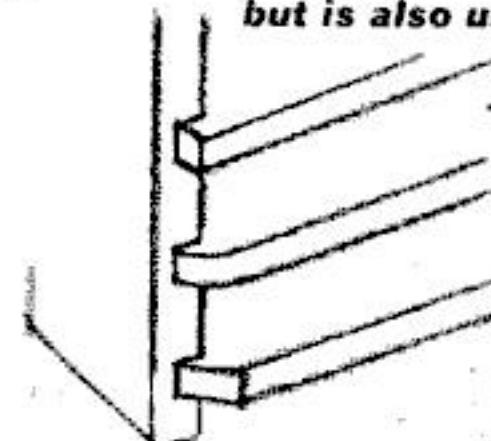


...hide cleat by cutting it shorter than shelf width...

DADO +



nails does job without cleat but is also unattractive ...



...camouflage dado by extending shelf

tion on the kind of wood you can use.

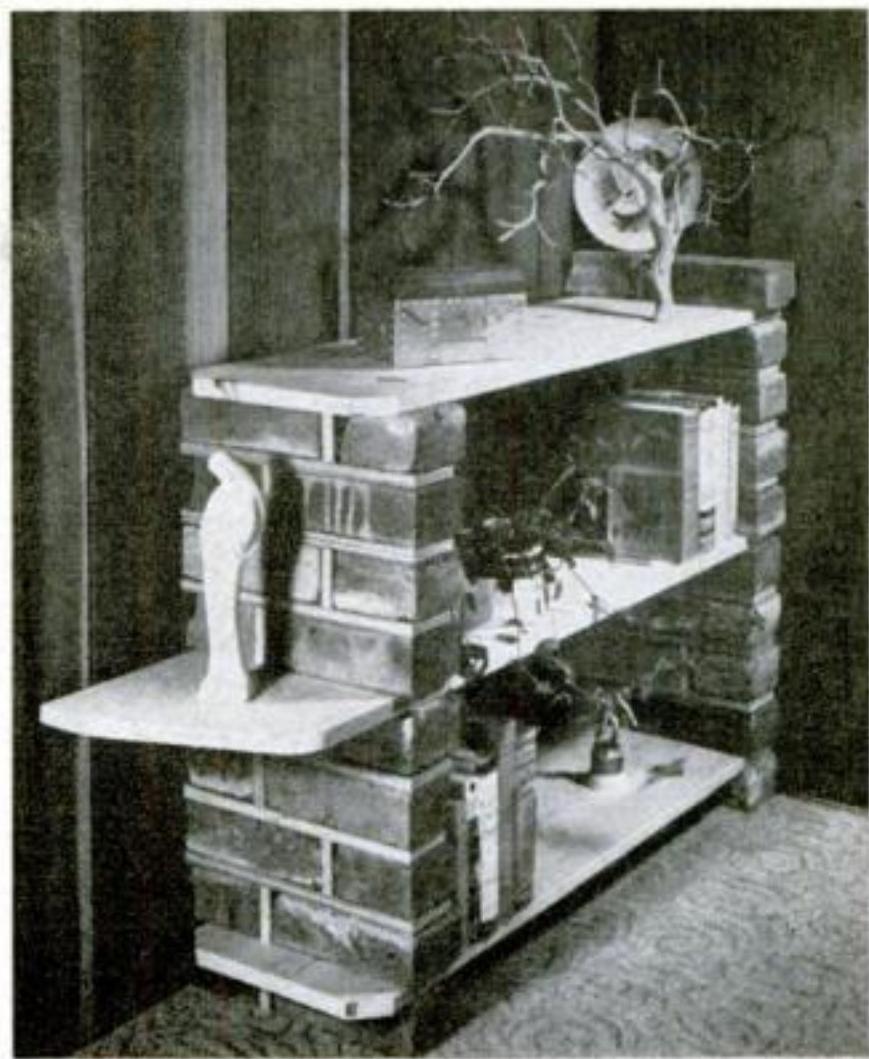
The joints. Most times, you don't have to go beyond a glued-and-nailed butt.

Other times a dado will do. Paradoxically, the stopped dado imitates the butt in appearance. So don't write off the butt unless the shelf must carry a really heavy load.

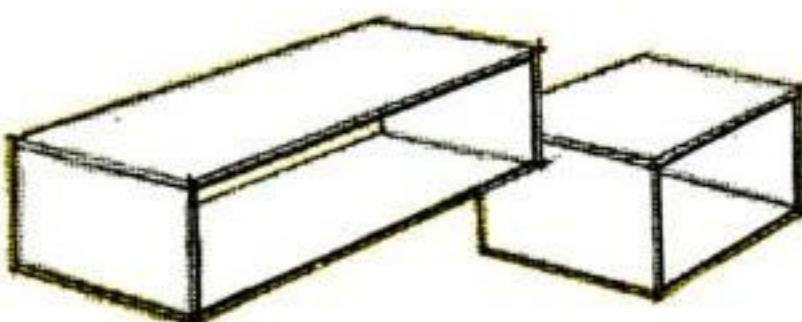
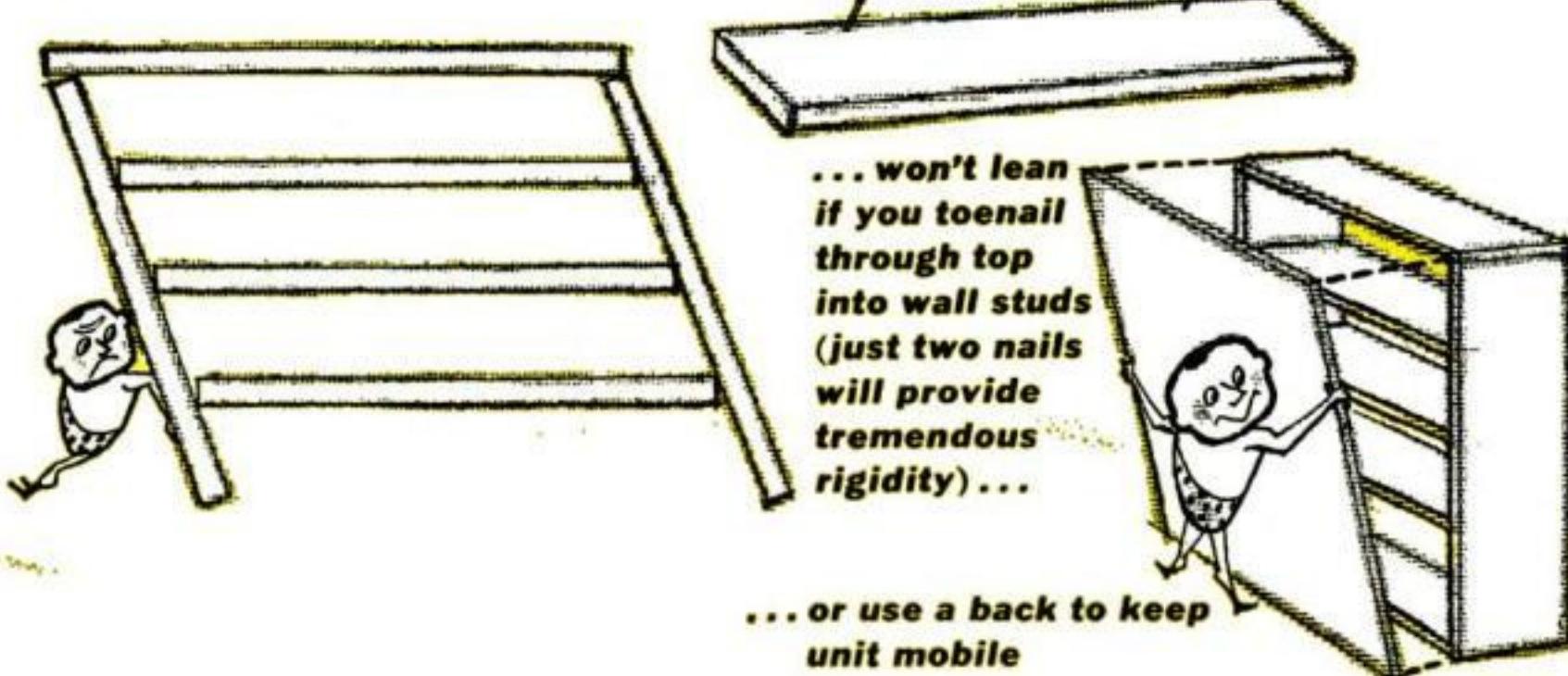
Fixed shelves contribute to the rigidity of a unit; adjustable ones don't. The latter require a frame that can stand independently. Whether you shop-make adjustable shelves or buy special hardware for the purpose, the verticals to which they connect must of course be rigid and secure enough to stand alone.

Shelves in a hurry

BUY BOARDS CUT TO SHELF LENGTHS and set them up on bricks, or cement or glass blocks. A handsome variant with brick: $\frac{1}{2}$ " strips of wood to simulate mortar. [Please turn the page.]



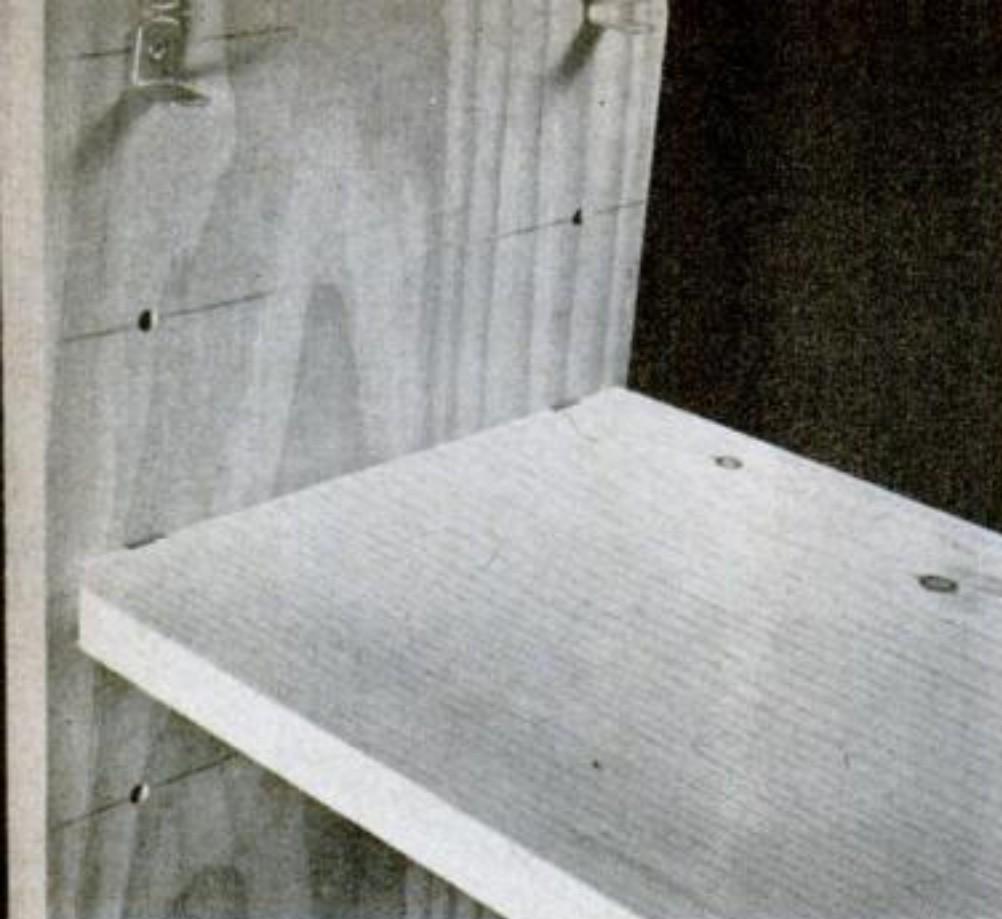
FREE-STANDING SHELVES ...



MODULAR UNITS

have great flexibility... make them like boxes





Adjustables: You can make them in your shop, or you can use

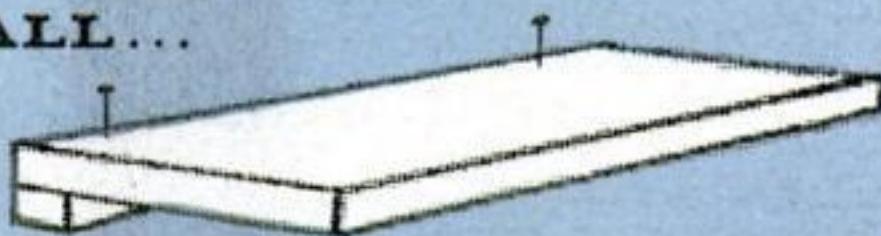
DRILLED HOLES AND L-SHAPED CLIPS are an economical way to provide adjustable shelves. Notching the shelf ends to fit over the clips gives a neat, flush fit against the uprights. Here's an-

other way (above, right): Nail dadoed strips to the side walls. Shelf, with corners notched away, rests on a cleat that fits the dado cuts. First, dado a wide board; then cut strips.

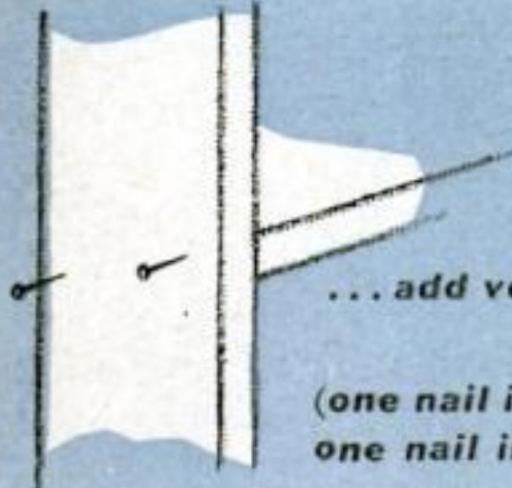
TO TIE SHELF TO WALL...



...nail cleat to studs...

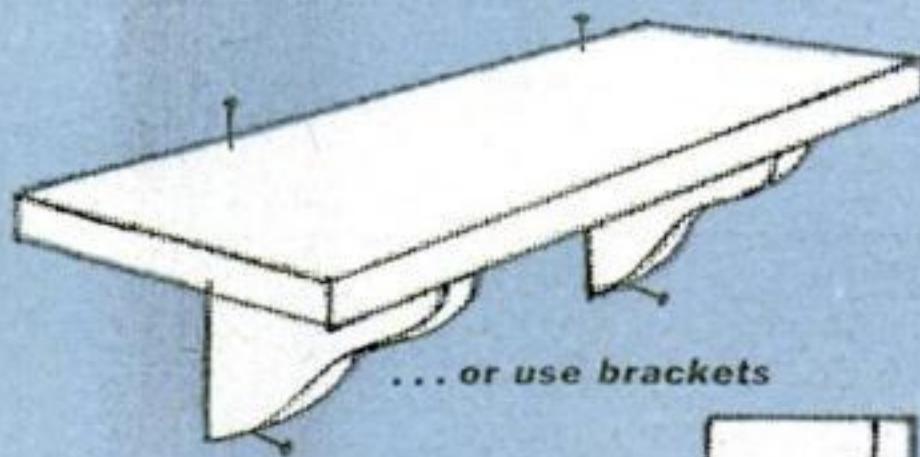


...add shelf...



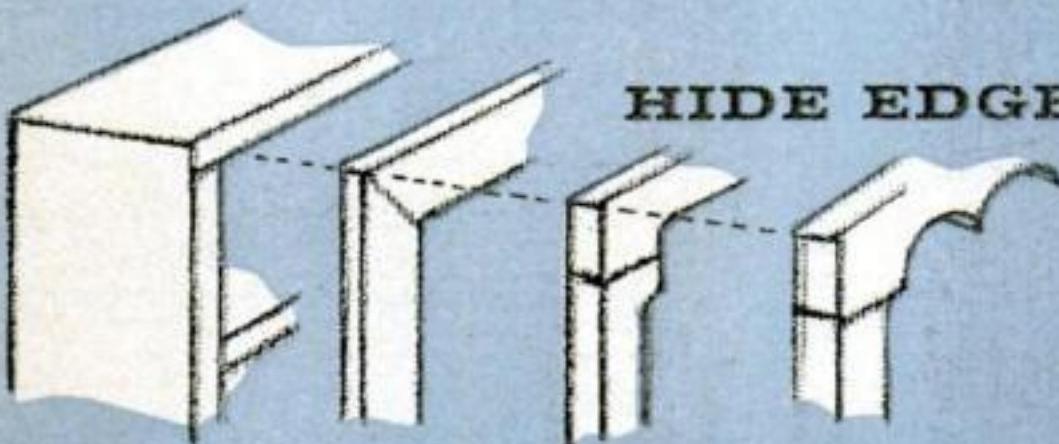
...add vertical...

*(one nail into cleat,
one nail into shelf)*



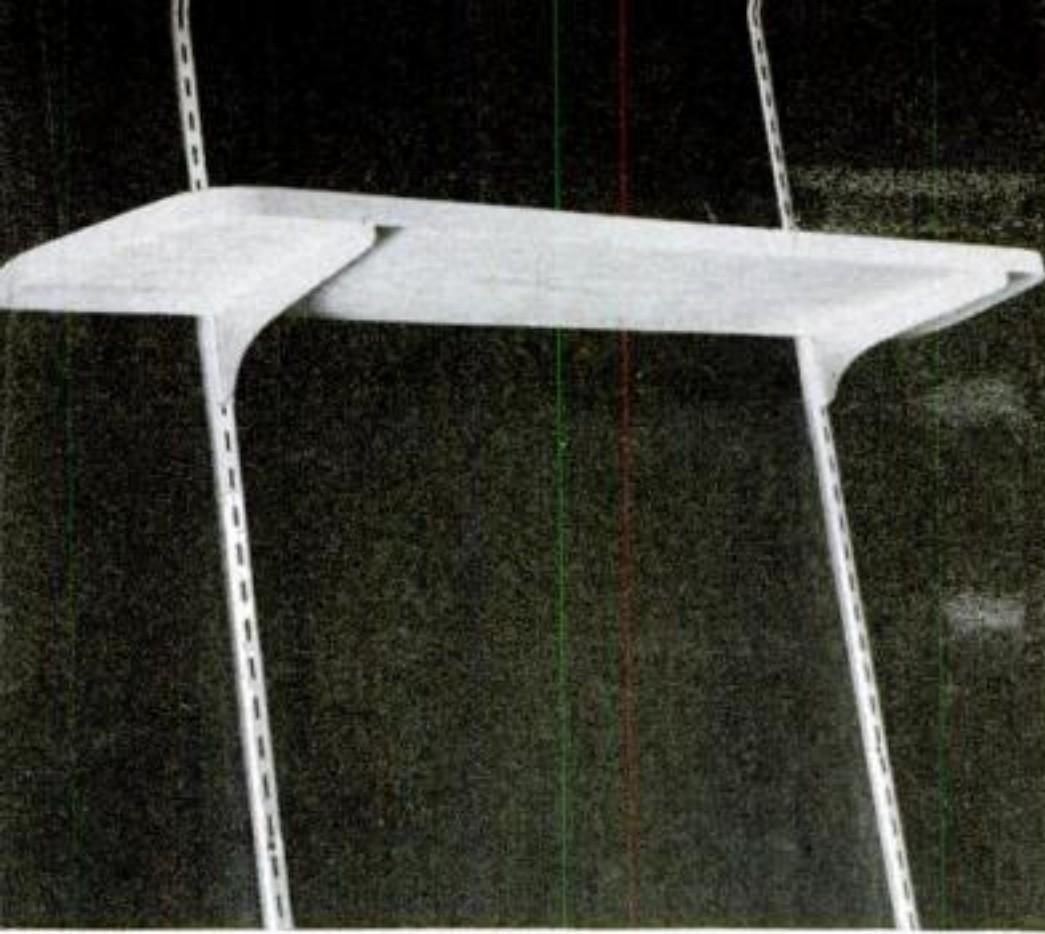
...or use brackets

*(you can make two
identical brackets
with one cut)*



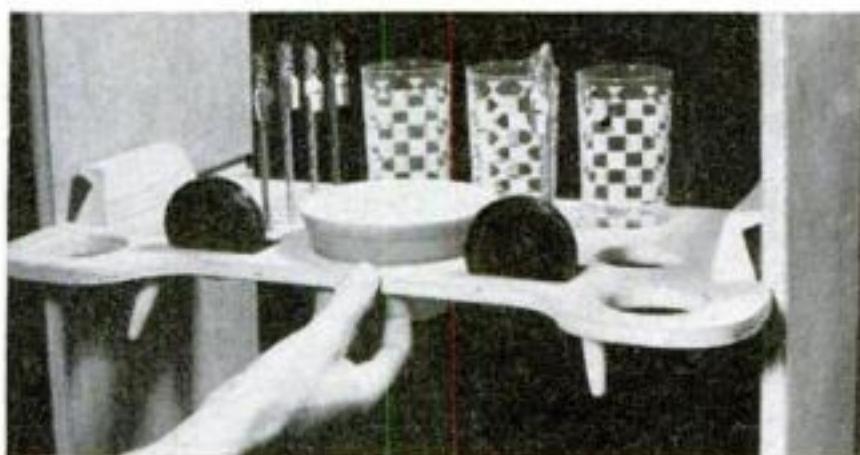
HIDE EDGES

and joints (and make the job look better) with framing, which can be plain mitered strips, moldings or fancy cuts



store-bought strips and clips

PERFORATED METAL STRIPS, with special clips or brackets, let you mount shelves in a cabinet, or directly on a wall. If fitted in a case, recessing strips in dadoes makes the job neater.



PULL-OUT SERVING TRAY slides smoothly on dadoes. To fit a tray like this in an existing cabinet, nail double cleats to the sides for tracks and place handles to clear them.



SPECIAL WOOD RODS for free-standing shelves are stocked by some hardware stores. Placed in mating holes in shelves they permit very rigid construction with a minimum of effort.



Egg-Crate Construction Cuts Shelf-Space Cost

THESE free-standing shelves are attractive three ways—visually, structurally and money-wise (no need for supporting side and back panels). Cost of all the plywood used came to \$6.30—less than half that of a comparably strong set of end-supported shelves.



ALL MEMBERS except a $\frac{3}{4}$ "-thick top shelf came from one 4'-by-8' sheet of $\frac{1}{4}$ " plywood. Shallow notches were cut in each horizontal panel (above), deeper ones in the verticals. Strips glued and nailed to both sets of panels behind each shelf (below) stiffened the framework and reinforced the notched shelf sections.



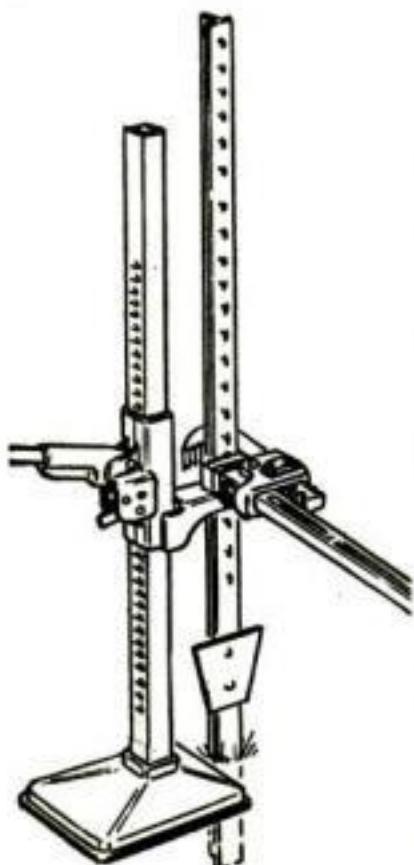
Short Cuts and Tips

FROM PS READERS

Spray Bottle Wets Cracks

FISSURES and cracks in cement and plaster have to be wet thoroughly before filling or the repair material will not readily bond to the sides. To do the job, I spray water into the crack with a mechanical window-spray bottle, holding the nozzle close so the water will penetrate.—*Arthur S. Green, Chicago.*

How to Pull Out Fence Posts

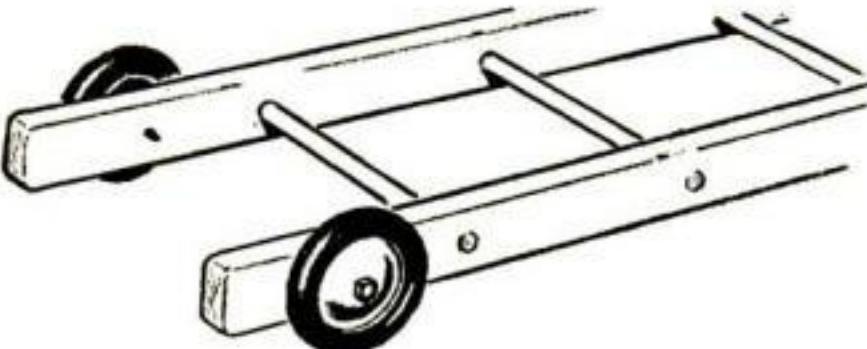


ONE way to pull an anchored steel fence post from the ground is with a car bumper jack and a pipe wrench. Lower the jack to its lowest point and hold it to the fence post with a large pipe wrench.

Then pump the jack handle, and the post will pull up. You will probably need a helper to keep the wrench on.

—*G. W. Paluzzi, Lexington Park, Md.*

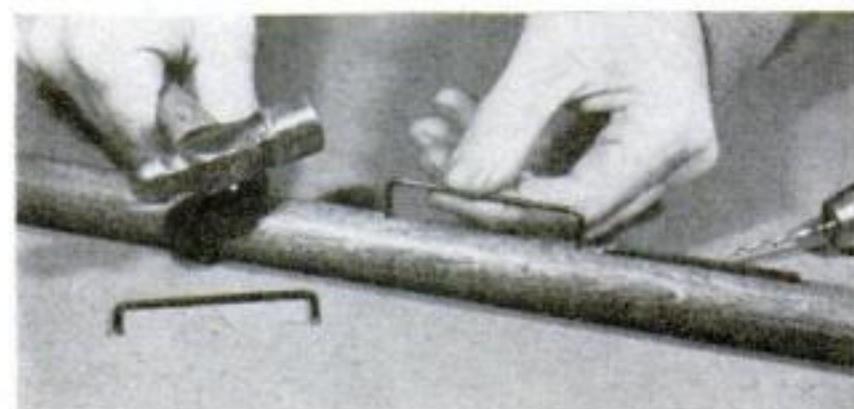
Easy Storage for Ladder



TO STORE my ladder in the crawl space under my porch, I fitted it with small wheels about 12" from the lower end. I mounted the wheels on lag screws having a diameter slightly less than the axle hole. Now, when I need to use the ladder, it's easy to pull the upper end out while the lower rides on its wheels. For storage I push the wheeled end in first.—*Joseph O. Covington, Hot Springs, Ark.*



Non-Twisting Broom Handle



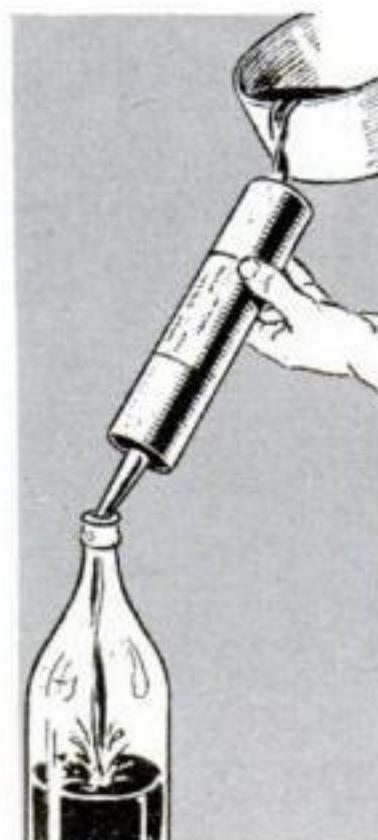
IF A broom twists in your hands when you use it while wearing gloves, try fitting the handle with ridges made from pieces of coat-hanger wire. Cut the wire into lengths of about 4" and bend $\frac{5}{8}$ " at each end at right angles. Then drill undersize holes in the handle at the places your hands hold, and drive in the wires.—*Walter E. Burton, Akron, Ohio.*

Funnel from a Calking Tube

DON'T throw away an empty calking-gun cartridge. You can convert it into a good funnel for filling bottles and other narrow-necked containers.

Clean out the unused compound and puncture the plunger disk by jabbing a long nail into it through the tip.

Now liquid will flow through readily.
—*Charles W. Schneider, Hawthorne, N.Y.*



HOW WELL DO YOU KNOW Carpenter's Lingo?

ALL of the 21 names and terms listed below are widely used in cabinetwork or carpentry. Take your pick of the accompanying definitions; then check them

against the answers on the following page. A perfect score indicates that you are either a woodworking wizard, or read POPULAR SCIENCE from back to front.

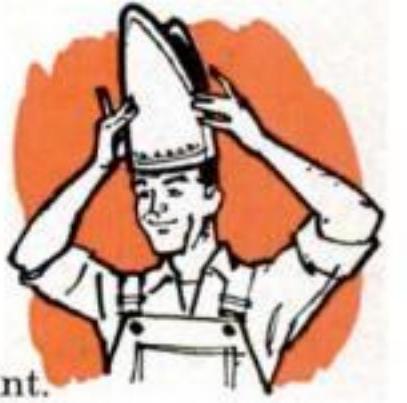
1. **kerf**—A: slang for scarf joint. B: saw cut. C: to round off. D: protective wrapping.
2. **gain**—A: extension rule. B: amount of rafter overhang. C: lumber saved by making two-by-fours $1\frac{5}{8}'' \times 3\frac{5}{8}''$. D: notch to accommodate a hinge.
3. **ogee**—A: longest distance across an oval cutout. B: clamp. C: form of molding. D: an exclamation, as when striking one's thumb an unexpected blow with a hammer.

4. **fleam**—A: carpenter's utility light. B: bevel of saw-tooth edge. C: to smooth by planing. D: concave trim.
5. **fillister**—A: ornamental nail. B: filing machine. C: groove-cutting plane. D: a long-winded carpenter.
6. **rabbet**—A: fluffy pad used for polishing. B: to wear away with many small strokes, as by gnawing. C: an edge groove. D: type of punch.
7. **mortise**—A: construction loan. B: opening to receive a tenon. C: box for mixing cement. D: coffin maker.
8. **swage**—A: surplus lumber. B: device for spreading saw teeth. C: to tilt. D: tool kit.

9. **tang**—A: handle-fitting projection. B: ringing sound, as of a well-balanced saw. C: oriental oil used in furniture finishing. D: rafter brace.
10. **chipper**—A: cabinetmaker's apprentice. B: to scallop. C: a notch in a glass cutter. D: inside dado knife.
11. **mullion**—A: pivot used to tilt a saw table. B: window-frame divider. C: any tool with an unlimited number of accessories—originally a scad. D: lathe dog.
12. **bastard**—A: the shorter of two banisters resting on the same stair tread. B: a

degree of coarseness. C: left-handed wood rasp. D: double-cut file.

13. **arbor**—A: platform. B: radial-saw column. C: shaft. D: a grove that produces carpentry wood.

14. **screed**—A: calking compound. B: stain obtained from a species of marine life. C: board used to level cement. D: attached with wood screws.
15. **winder**—A: Jacobs chuck key. B: stair tread whose sides are not parallel. C: hand drill. D: split-phase motor.
16. **rout**—A: hole left by removal of a knot. B: to scoop or furrow. C: panicky retreat from a circular-saw kickback. D: guide line for saber-saw cut.
17. **miter**—A: tape calibrated in Continental units of measure. B: workman's hat shaped like clerical headgear. C: mineral used in sandpaper. D: type of joint.

18. **plumb**—A: cut in framing to accommodate water pipe. B: vertical. C: Colonial wood turning or carving shaped like the fruit of the same name. D: hole-center finder.
19. **shore**—A: to prop. B: irregular edge. C: the lee side of ship lap. D: expression meaning: "Yes, I'll sweep up the joint."
20. **header**—A: hammer used to peen rivets. B: what you take from a carelessly placed ladder. C: timber that supports tail joists. D: bathroom framing member.

21. **fret**—A: reaction of a workshop widow. B: sharp ridge. C: chaffing block. D: to cut intricate designs.

Carpenter's Lingo Answers

1. **kerf**—B: saw cut. In measuring boards for cutting, you'd allow for the width of the kerf.



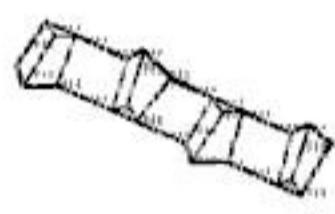
2. **gain**—D: notch or recess for a hinge, joint, etc.



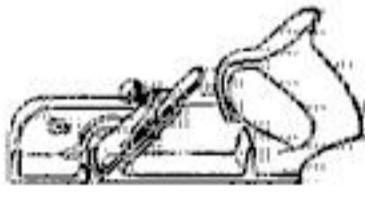
3. **ogee**—C: molding with an S-shaped cross section.



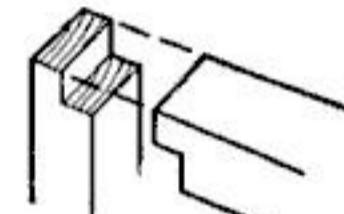
4. **flame**—B: bevel of saw-tooth edge as related to the sides of the blade.



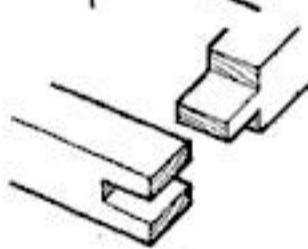
5. **fillister**—C: adjustable plane designed for cutting grooves and rabbets.



6. **rabbet**—C: edge groove, generally cut to receive another piece.



7. **mortise**—B: opening to receive a tenon. A tenon is a shouldered-down projection made to fit a mortise.



8. **swage**—B: device for spreading circular-saw teeth; more generally, a backing block used to shape metal.



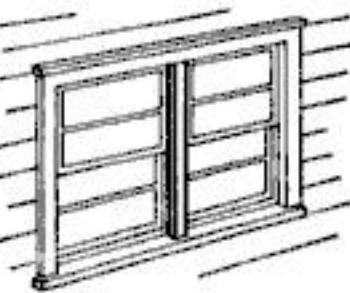
9. **tang**—A: handle-fitting prong on the end of a file, chisel, etc.



10. **chipper**—D: dado knife placed between outside saws. The number of knives determines the width of cuts.



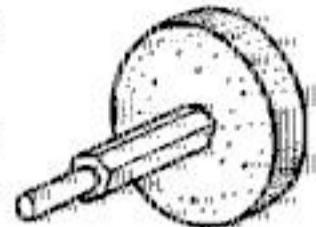
11. **mullion**—B: vertical bar between windows placed side by side.



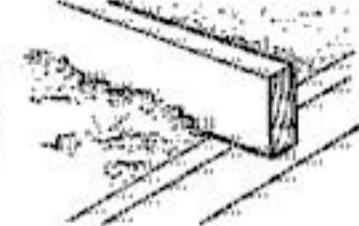
12. **bastard**—B: a specific coarseness of a file (30 teeth per inch).



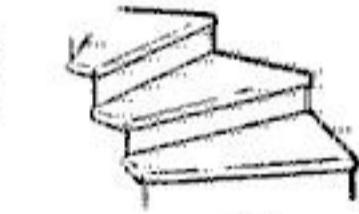
13. **arbor**—C: shaft upon which a circular saw blade, grinding wheel or other rotary tool is mounted.



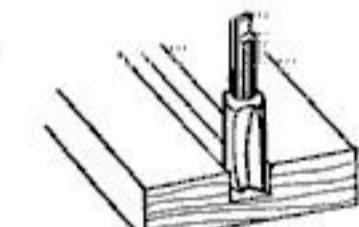
14. **scrab**—C: board drawn across a form to level poured concrete.



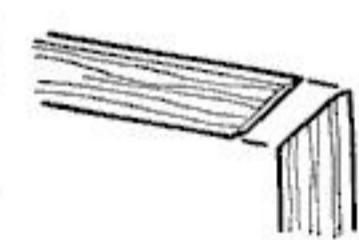
15. **winder**—B: any wedge-shaped tread in a winding staircase.



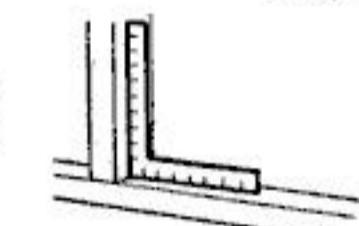
16. **rout**—B: to scoop or furrow, as in making grooves, rabbets, tenons, etc.



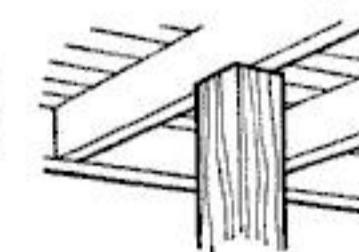
17. **miter**—D: joint (usually a right angle) formed by uniting two members with angled ends.



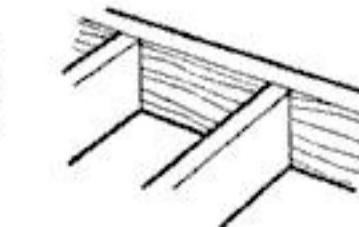
18. **plumb**—B: vertical in relation to a floor or other horizontal plane.



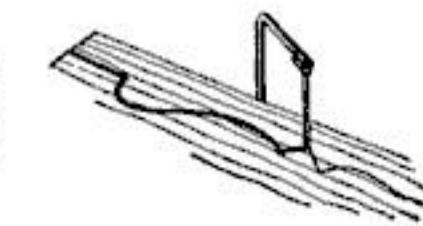
19. **shore**—A: to prop, as to place a timber under a sagging beam.



20. **header**—C: beam set on edge, to which tail joists are attached.



21. **fret**—D: to cut intricate designs with a saw of the same name.



There Was a Young Woman Who Lived in a Trailer...

MRS. DONALD L. WATKINS
AMBER ROAD
MARIETTA, NEW YORK

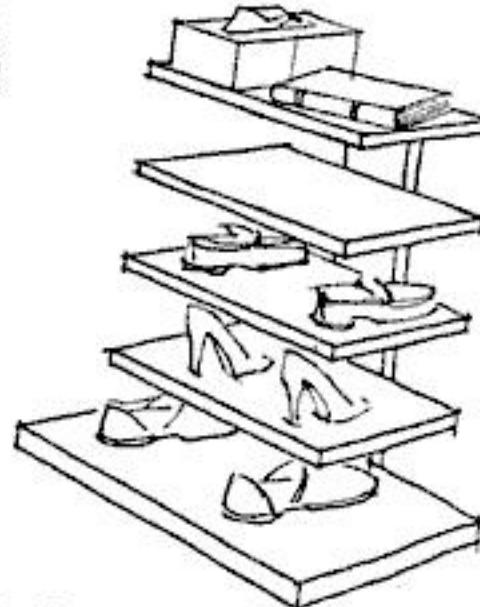
Dear Editor:

As the mother of two babies under two years, living in a 42-foot trailer with a husband who works six, sometimes seven days a week, I have been forced to become "the man of the house" when things need fixing. Believe me, I know now that what I used to call "silly husbands'-puttering" is really hard work.

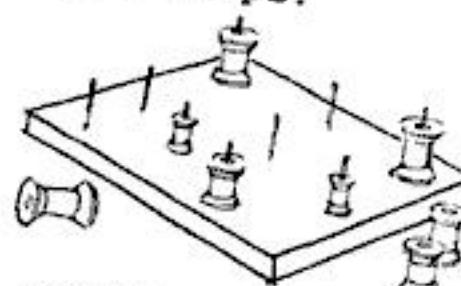
This is where your wonderful magazine comes in. My husband Don and I both love it. So many of the ideas are just what we need. That's why I am writing to you about some of the things I've made.

Life in a trailer is quite cramped at times and I was so sick of seeing scattered shoes. So, off I went to the woodshed and started out on a big evening of sawing and cutting. I'm sure there's nothing unusual about the things I've made, but they might be just the ticket for some other "man of the house" who glances at your magazine.

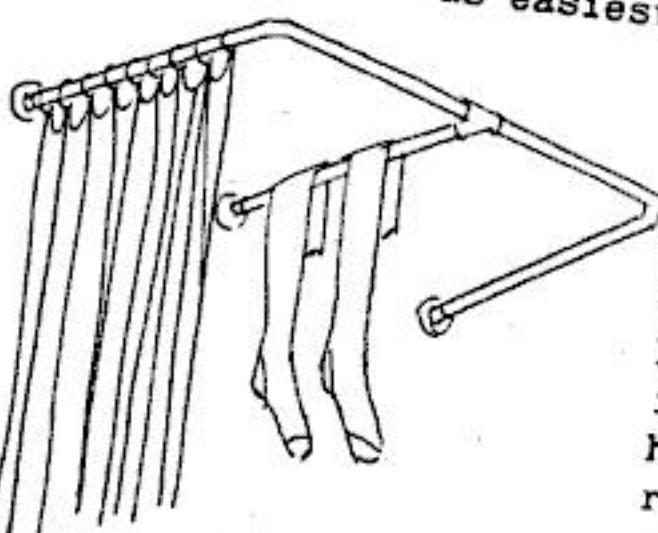
My "shoe tree" is perfect for our trailer home where there isn't room for anything elaborate. I really didn't do any sawing on this as I used just what I had on hand. But I sanded it all down and shellacked it.



For my little son I made a combination toy garage, chair, stool, drawing table and toy carry-all, using four pieces of wood. He makes this into a gas station by placing a larger board on with scraps of wood and painted odds-and-ends which are fastened together to make gas pumps.



For my young daughter I made a spool board out of a square of wood, just by driving some headed nails here and there on one side of it. She has a great time trying to put spools on these nails. A round board would have been better, but, well, this was easiest for me.



Another idea for small homes: We put a rod across the center of our shower for drying baby things, lingerie, etc. Why aren't showers made this way? (Or are they?) Well, I have more little ideas but I'd better quit while I'm ahead. If you happen to find any of these publishable it would mean so much to me. You see, I haven't told Don I'm writing. It would really surprise him to see my name in his magazine.

Sincerely,

Nadine Watkins

Here's a new and practical idea:

Concrete Work Tables for the Basement

By John Burroughs

BASEMENT benches and work counters are generally placed on a concrete floor against a concrete wall. So why not make them of concrete? They'll be solid, permanent, attractive and inexpensive.

Make their *understructures* of concrete, that is. For the tops, use double-thickness plywood, 1" for a counter, 1½" for a workbench.

A form for the base members is easy to knock together from ½" plywood and a two-by-four. Leave one side, as well as the back, off if you pour slabs cheek-to-cheek with foundation walls. For long benches and counters, the sloped uprights should be spaced at intervals of about five feet.

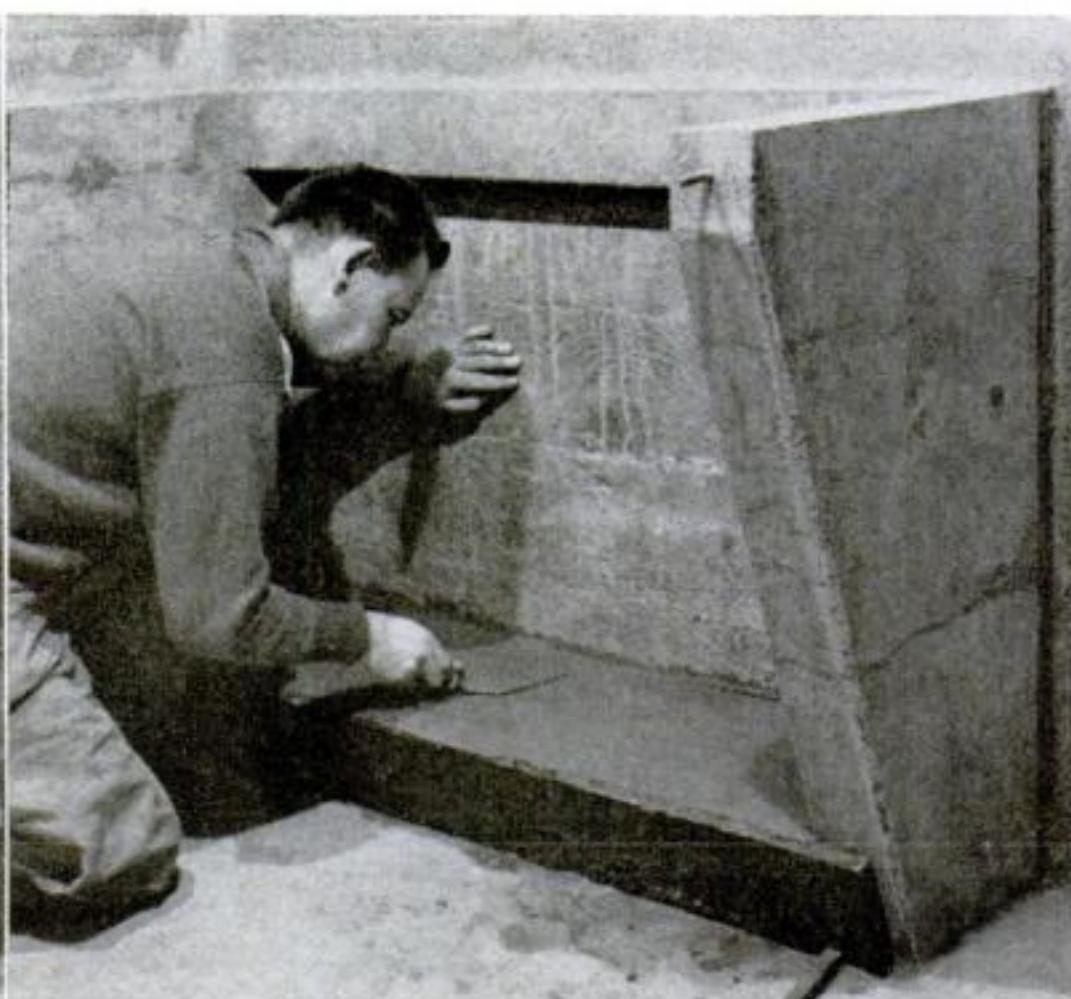
A few heavy props—short timbers or blocks—will hold the forms in place

while you dump in the concrete and let it set. It will bond well to a rough, unpainted masonry wall if you wet the old surface thoroughly first, and paint joint areas with one-to-one-part cement-sand mortar. If your basement walls are smooth finished or painted, rough up the surfaces first with a cold chisel or masonry bit in an electric drill. In earthquake areas, or in the case of a settling foundation, it's also well to embed three or four husky bolts or hooked studs in the wall to give added key. Bore holes for them with a masonry drill and lock them in with iron cement. In any case, don't forget to bed bolts near the tops of the slabs, to provide fastenings for a two-by-four counter apron.

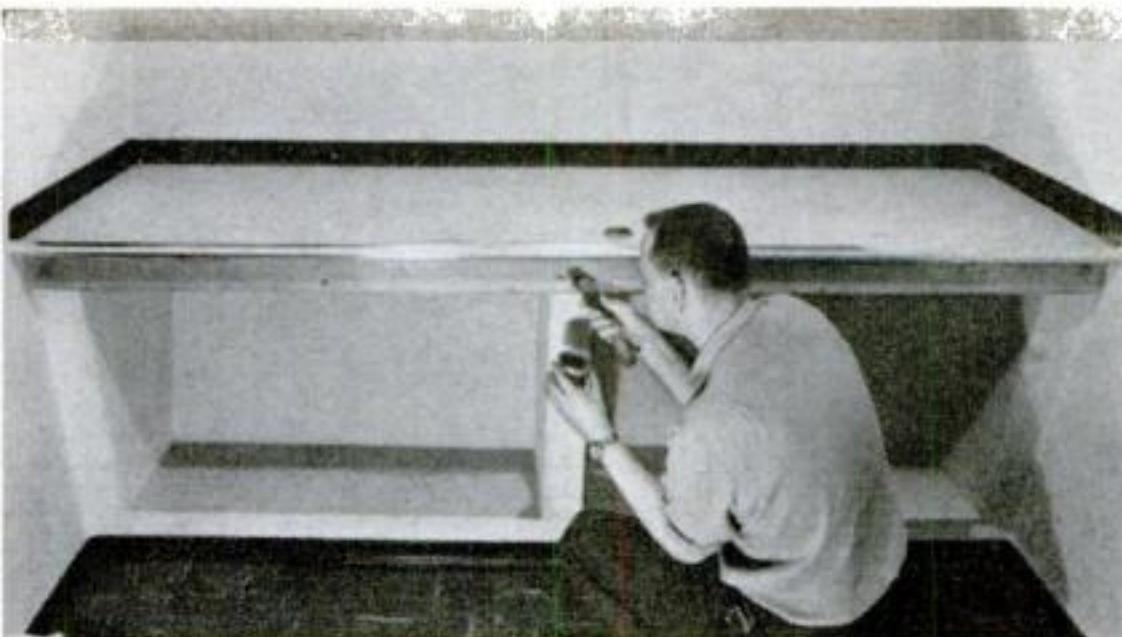
After the uprights set, cast a concrete back beam in a trough-like form, made by nailing a couple of 1"-thick boards at right angles to each other. Then wedge



ONE FORM IS USED for all cast uprights. C-shaped piece of plywood prevents spreading at the top of free-standing form when the mix, three parts sand to one part cement, is poured.



FORM FOR BOTTOM SHELF is a one-by-six, wedged against the sloping fronts of the end slabs. The back beam is cast in a trough-like form propped from below between the uprights.



a one-by-six against the bases of the uprights and pour a bottom shelf.

Remember that it takes 28 days for concrete to cure thoroughly. While you can safely disassemble a form 48 hours after pouring a slab, you should dampen the work with occasional light spraying at intervals during the first week or so.

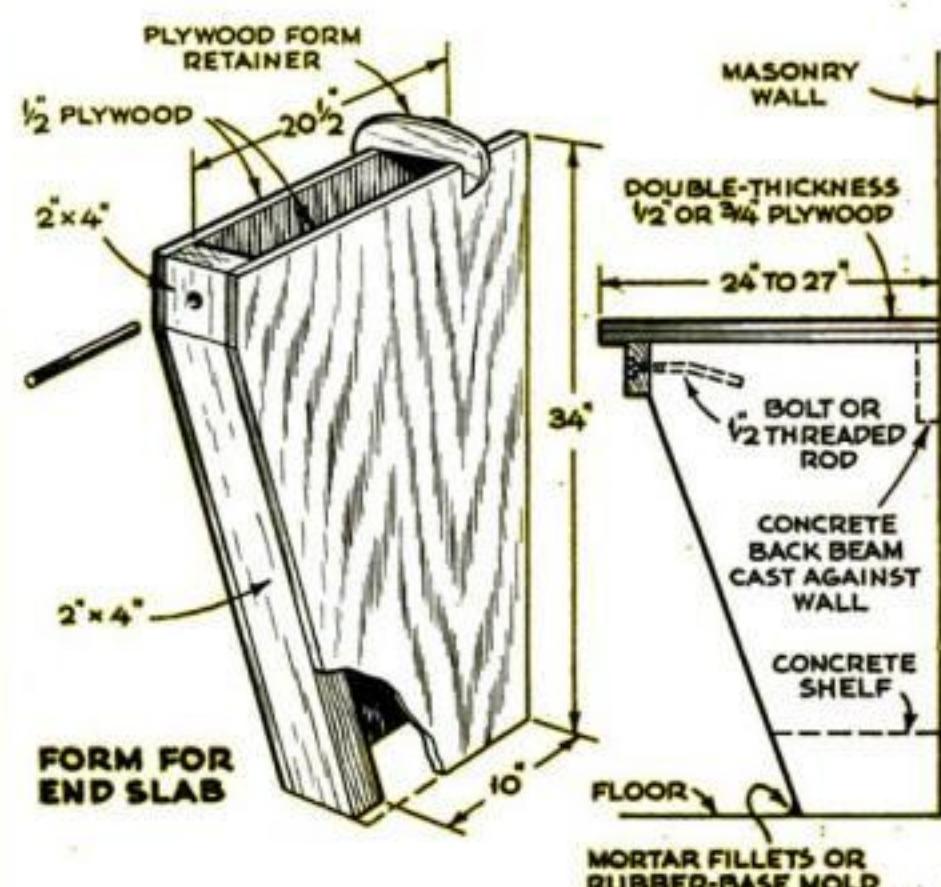
If you find it necessary to fill any pits in the castings, use a one-to-one mortar mix. Then smooth up the job with a silicone carbide rubbing brick, rounding off outside corners slightly. Finally, apply a coat of masonry paint to all but the understructure's top surfaces. Trowel black mastic adhesive on these, and press the counter or bench top firmly in place.



DOUBLE THICKNESS (1") plywood top on cast-in-place concrete supports makes a rock-steady enlarger stand (above). The long table shown in the photo at upper left was tricked out with an enameled apron, counter-top surfacing, metal edging, and rubber cove and base molding.

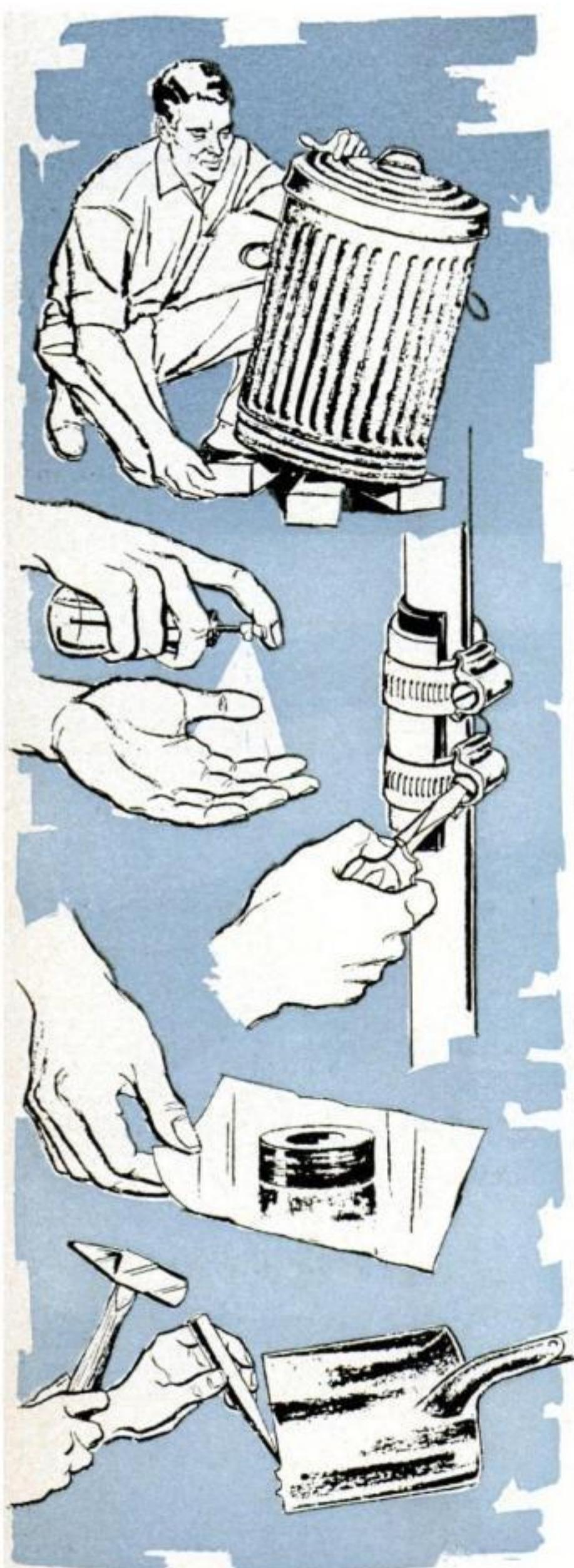


BEFORE FITTING THE TOP, apply a coat of masonry paint, scrubbing it well into the pores of the concrete. Then bolt on the front beam and attach the bench top with mastic adhesive.



SLAB FORMS ARE EASY TO MAKE. The one used for uprights is open at the back. When the casting skirts an end wall, one side is removed. Note the bolt-spotting hole at front.

5 Budget Savers



1 Put a garbage can on stilts to protect the bottom and you won't have to replace the can so often. Raising it off the ground on a few bricks will let air circulate around and under the base.

2 Keep turpentine handy for cleaning paint-spattered hands. Instead of wrestling with a large container, pour some of the liquid into an empty spray bottle of the type used to dispense glass polish or hand lotion. A downstroke of the pump will squirt solvent directly on your hands or on a piece of cloth.

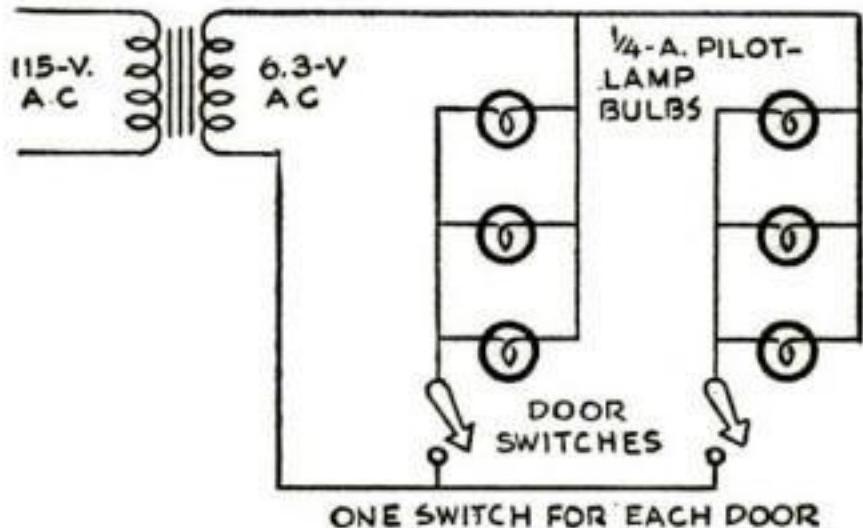
3 A small leak in a water pipe can be easily and permanently repaired with a small section cut from a scrap of larger pipe. With a piece of inner tubing serving as a gasket, fasten the pipe section in place tightly with hose clamps.

4 Stored electrician's tape often loses its sticking power. If you park yours on a shop shelf and use it infrequently, wrap the roll in aluminum foil to keep the adhesive from drying out so fast.

5 If a shovel shows wear at the front edge, don't discard it as useless. Remove the jagged portion with a cold chisel and sharpen the new edge with a file. Though shortened, the old tool will still be serviceable for many jobs.

Short Cuts and Tips

FROM PS READERS



Putting Light on the Inside of a Cabinet

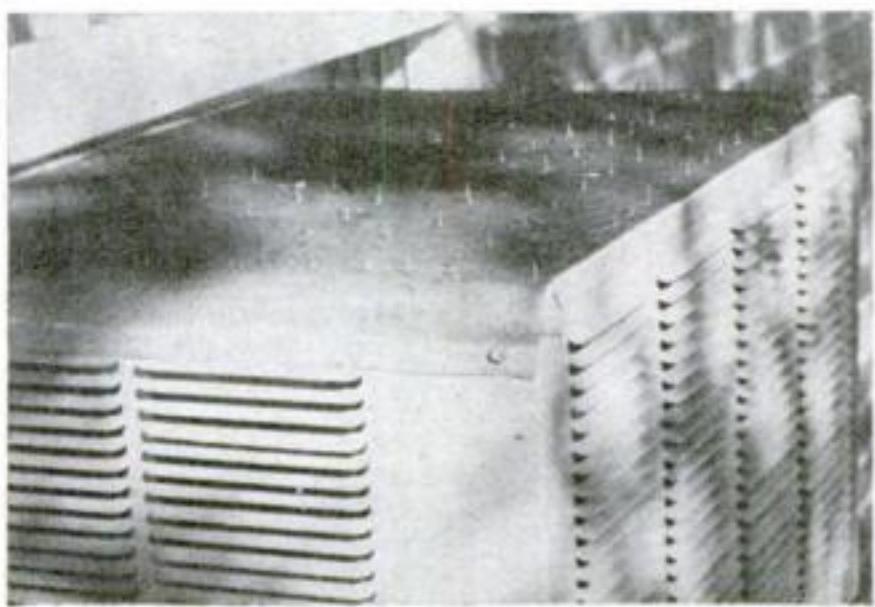
I LIGHT the interiors of kitchen cabinets and the like with radio pilot lamps run from a 6.3-volt bell transformer on a parallel circuit of bell wire. It takes less space than thin-wall conduit or BX, the wire is stapled or held by masking tape

on the inside, and the transformer is stored on one of the shelves. The lights are controlled by door switches. If your dealer doesn't stock $\frac{1}{4}$ -amp pilot lights, white Christmas-tree bulbs will serve.—*W. C. Bellheimer, Dolton, Ill.*

►►►REMEMBER that you can prevent bleed by sealing old paint or stain with a thinned coat of shellac before applying new paint. This is particularly helpful when putting a light coat over a dark.

►►►You can stop slippage with emery cloth when a bolt and nut won't hold. Fold a piece back to back and punch it to fit against the bolt head. The grip is excellent.—*John W. Nestler, Tampa, Fla.*

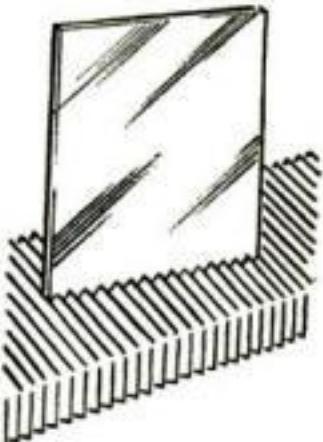
Cat-Proof Conditioner Cover



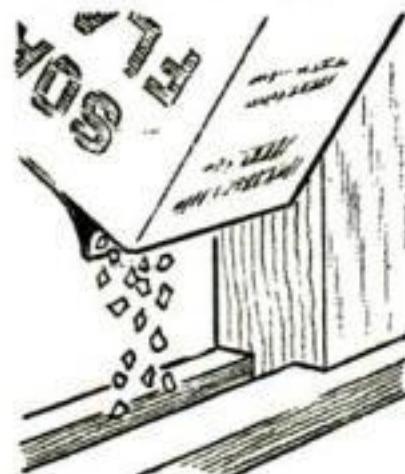
A TACK-STUDDED cover will keep neighborhood cats off your window air conditioner. Cut window screening slightly longer than the top of the unit to allow an inch or two for folding over the sides. Then drill corner holes for self-tapping screws and attach after inserting carpet tacks, point up, through the screen.—*W. F. Gephart, Dallas, Tex.*

File Makes Its Own Cleaner

SCRAPE the edge of a square inch of sheet metal, such as galvanized roofing, back and forth across a file. It cuts teeth in the metal which in turn clean out the clogged teeth of the file.—*Boyd J. McWhorter, Moorefield, W. Va.*



Lubricating Sliding Doors



THE hard-to-reach grooves in which cabinet doors slide are easy to lubricate with soap flakes. They coat the bottom surface, letting the doors glide smoothly.—*Donald Edwards, NYC.*

**Some surprising facts
about garden rakes:**

The Tool Almost Everyone Uses

By E. D. Fales Jr.

THE other day a chap told me that more than 5,000,000 *new* lawn and garden rakes are bought each year. This is an astonishing figure. Rakes don't wear out very fast. Last year's models and those of many years back are still going strong.

You begin to accept the figure, however, when you see the care lavished on lawns. Then you reflect that each *new* home must have at least one rake, and the figure becomes credible.



All rake—and more than a yard wide!

WORLD'S LARGEST LAWN RAKE, above, is not only high-styled to match its high-heeled mistress, but has a whopping 44" sweep. Convertible model below at left switches from flexible

broom to a stiff claw for matted-in debris by sliding a brace down the tines. You can even add wheels. Tiny rubber tires at right keep a steel rake from digging in on grass or gravel.





Many shapes for many jobs

A FEW OF THE 50 TYPES YOU'LL FIND include baby shrub rakes, leaf fans (now made in steel as well as bamboo), double-edged wire rake for both lawn and garden, and specials for removing crab grass and dandelions.

Rakes most in use nowadays are the flexible, fan-shaped ones, made of bamboo or springy steel and ideal for manicuring a lawn. George McGuire, who brought the first fan-shaped bamboo rake here from Japan in 1919, had his troubles with them. Stores said they were too "flimsy." To get rid of them, McGuire virtually gave them away to professional gardeners. Then other gardeners began asking for them. Within a few months he had hit the jackpot. He's still in business today.

Birth of the "broom" rake. The bamboo rake brought with it a brand-new technique in lawn care. Instead of pulling, as you usually do with an iron garden rake, the idea is to hold it like a broom and *sweep*. This is faster and less tiring. The springy fingers press into the turf and clear out dead grass, leaves and twigs without harming good grass.

Two struggling old-timers are still around, but are gradually losing out. One is the double-headed wire rake with prongs on one side and loops on the other. The other is the ancient wood-peg rake, which some gardeners prefer because the rounded pegs provide gentle combing action without tearing up roots. When the pegs wear short or break, you replace them—or used to be able to—for a nickel apiece.

Bigger and bigger. Lately some startling things have been happening to lawn rakes. Some people discovered you could

How the two basic rakes are used

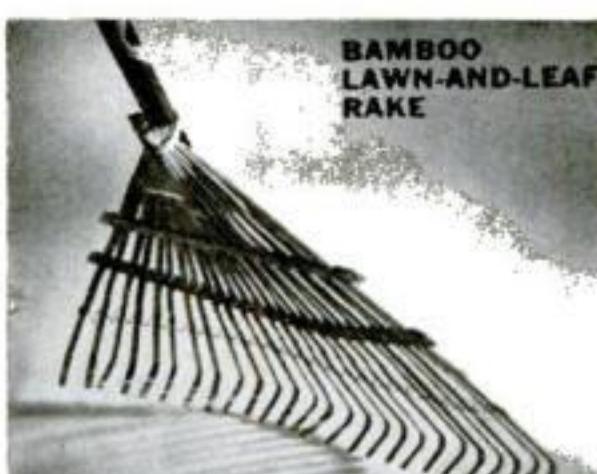


BOWHEAD
GARDEN
RAKE



LEVELHEAD
GARDEN
RAKE

1
RIGID
"PULL"
ACTION



BAMBOO
LAWN-AND-LEAF
RAKE

2
FLEXIBLE
"BROOM"
ACTION



STEEL
LAWN-AND-LEAF
COMB



Pictorial history of lawn and garden rakes



HUMAN HAND

Earliest known rake—still in occasional use today, though mostly under protest. It is small, and tends to blister.



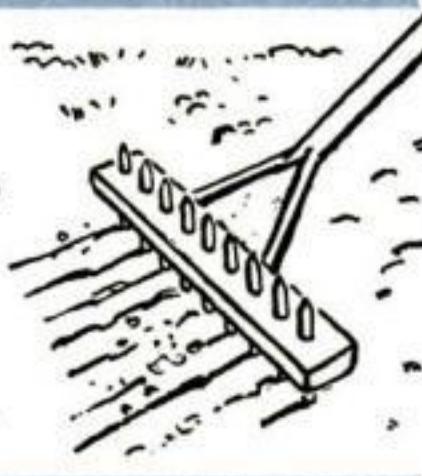
BUSH RAKE

Branches from trees or bushes provided one of the earliest—though not too effective—earth-smoothing tools.



FORKED STICK

Sticks split at the ends and spread apart by wood wedges became one of the earliest soil rakes that could claim rigid tines.



WOOD-PEG RAKE

Forerunner of the iron rake, it became popular for leaves and grass, and is still well liked because of its gentle action.



IRON RAKE

Only a few centuries old, was first made by farmers by driving iron spikes into a wood crossbar. Modern kind is forged steel.



BAMBOO FAN

Newest of all rakes, this came to U. S. only in early '20s, was not widely used until postwar passion for suburban lawn care.

cover more ground faster with a 24"-wide rake, and now these are selling as well as the 18-inchers. Still more recently, 30-inchers have begun to take hold—and even giant 36-inchers. To top everything, the Gardex Co., in Michigan City, Ind., has begun selling a knocked-down giant called "Lawn Sweep." It's the world's largest lawn rake—44" across. At about \$10, it's selling surprisingly well.

Bamboo or steel? There's quite a battle among the rake makers. The bamboo men argue that steel lawn-and-leafers rust, break, and can get hot enough to soften if used near fires. The steel men shout right back that bamboo snaps and burns.

Both cries have some merit. A steel rake will rust away like any good tool if left outdoors, and if carelessly left too long in a fire may lose its temper. Some cheaper bamboo rakes, bound with tight galvanized wire, are brittle and may snap. Better bamboo rakes, which go for \$1.50 to \$2.75, are often bound with fine flexible spring spirals. These "spread the work" among all the tines.

The bamboo people also say that many of their rakes are now used to smooth gravel driveways—traditionally a job for the back side of rigid steel rakes.

The garden rake. Garden rakes go back to the American Revolution and have always been built for work—no glamor. But what most people don't know is that you have several choices.

Garden rakes are made for "heavy duty" or "light duty." For cracking hard, dry soil (or clay) a heavy-duty rake is the tool. This may be 15" to 17" wide, with long, strong teeth. It packs real weight, three to $3\frac{1}{2}$ pounds, and the head may be $\frac{5}{6}$ " steel.

But for softer, pulverized soil, a light-duty rake is enough (and may save your muscles). Its thinner ($\frac{1}{4}$ ") steel has fewer, shorter ($2\frac{1}{2}$ ") teeth and weighs a half-pound less.

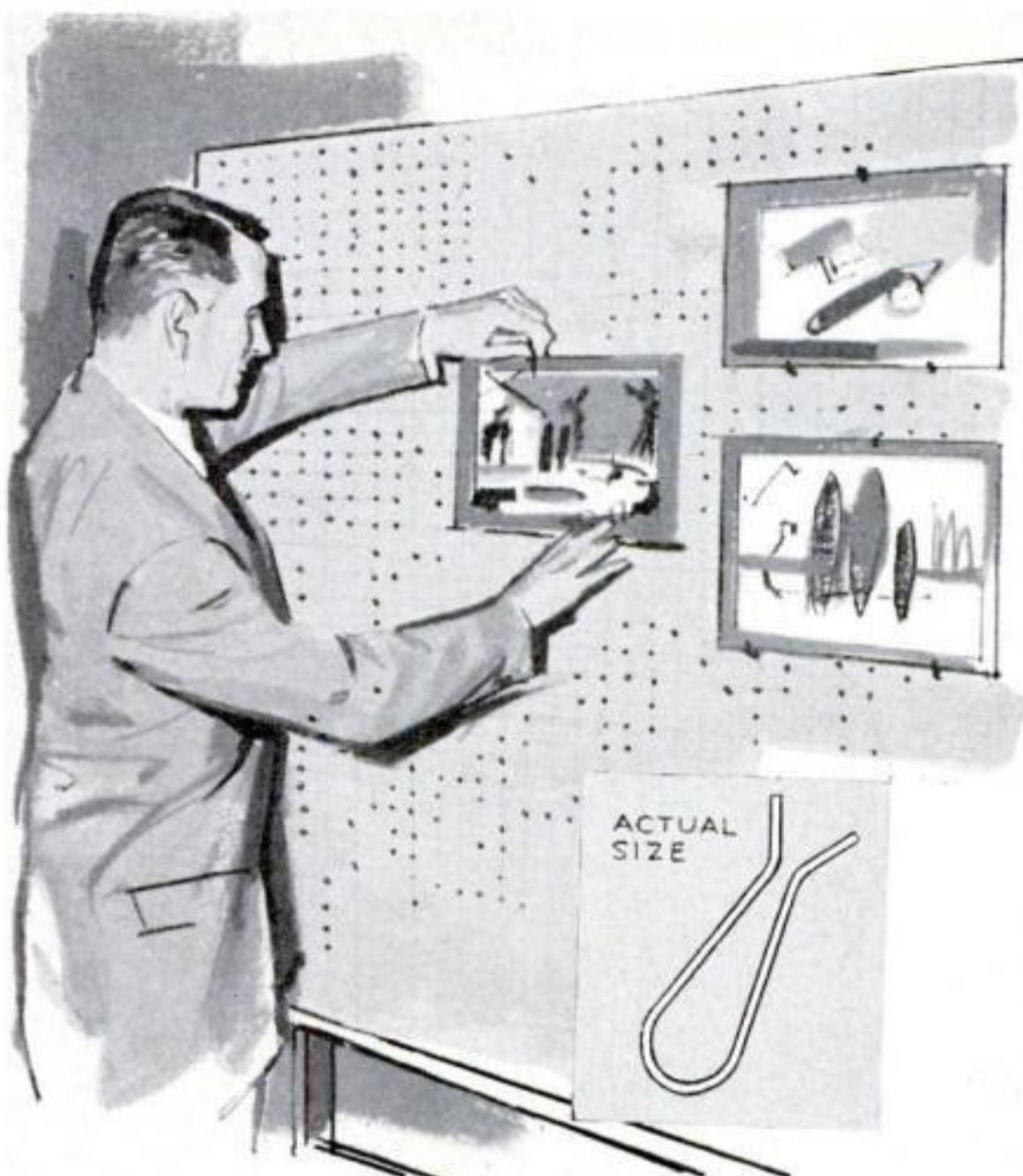
"Level" or "bow"? Perhaps you've wondered why there are two different shapes of rigid steel rakes. One has a straight or "level" head, with a single stem connecting it to the handle. The other has two arms at the ends that curve toward the handle forming a "bow."

True-Temper, one large maker of garden tools, candidly admits that the level-

[Continued on page 250]

Short Cuts and Tips

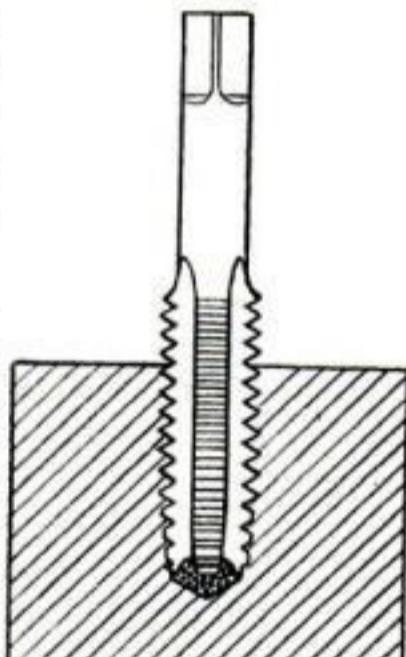
FROM PS READERS



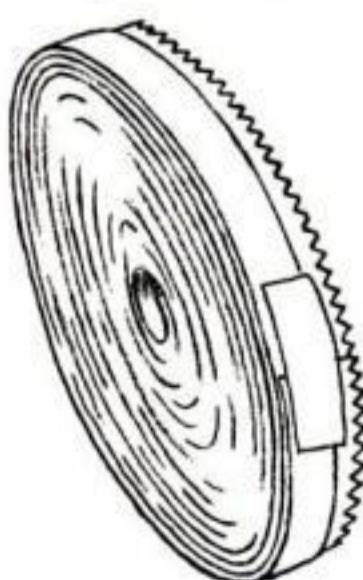
Tip on Tapping Blind Holes

You can reduce tap breakage in blind holes by hollow-grinding the end to form a cavity in which chips collect.

This chip space will let the tap cut threads to the extreme depth of the hole without binding on a tight packing of chips.—*Carl L. Beddig, Oakland, Cal.*



Simple Non-Clogging Scraper



FOR a non-clogging scraper to use on soft wood or plaster all you need is the serrated-metal strip from a foil or wax-paper package. Coil it tightly around a kitchen match and tape the end firmly.—*Fred Reehl, Fort Lauderdale, Fla.*

Two-Sided Display of Mounted Photos

OUR department was to exhibit photographs on both sides of a perforated-hardboard display panel. But the clips supplied to hold cardboard mounts worked on only one side of the panel. They stuck out on the other so far they interfered with hanging mounts there.

Experimenting with paper-clip wire, I devised this special clip. It holds mounts on both sides at the same time when they are arranged back to back.—*William M. Kussman, Chicago.*

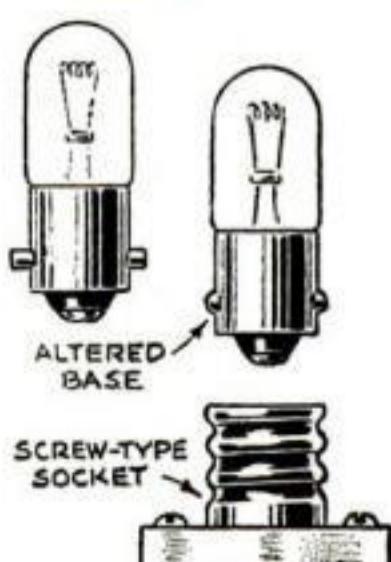
Steel Wool Backed with Block



You can get a more even surface on wood or metal if you finish it with steel wool fastened with wire or cord to a 3"-by-6" backing block. When the pad wears down, you can reverse it on the block and retie it.—*T. E. Halldorson, Evanston, Ill.*

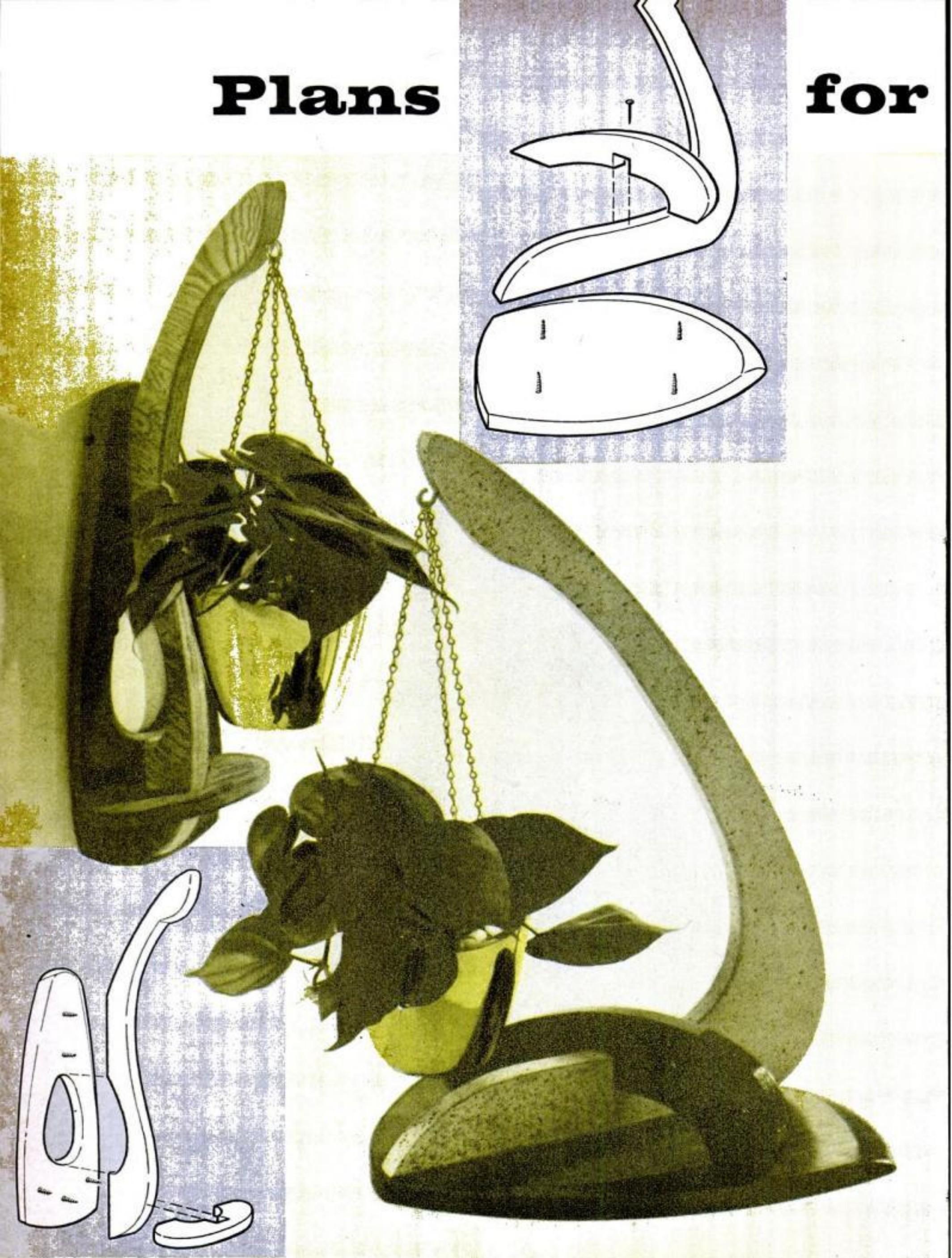
Converting Base of Bulb

NEEDING a new bulb for a screw-type socket and having on hand only one with a bayonet base, I adapted it by filing off all but a slight projection of the bayonet pins. It resulted in a good tight fit.—*W. E. Wood, Miami, Fla.*



Plans

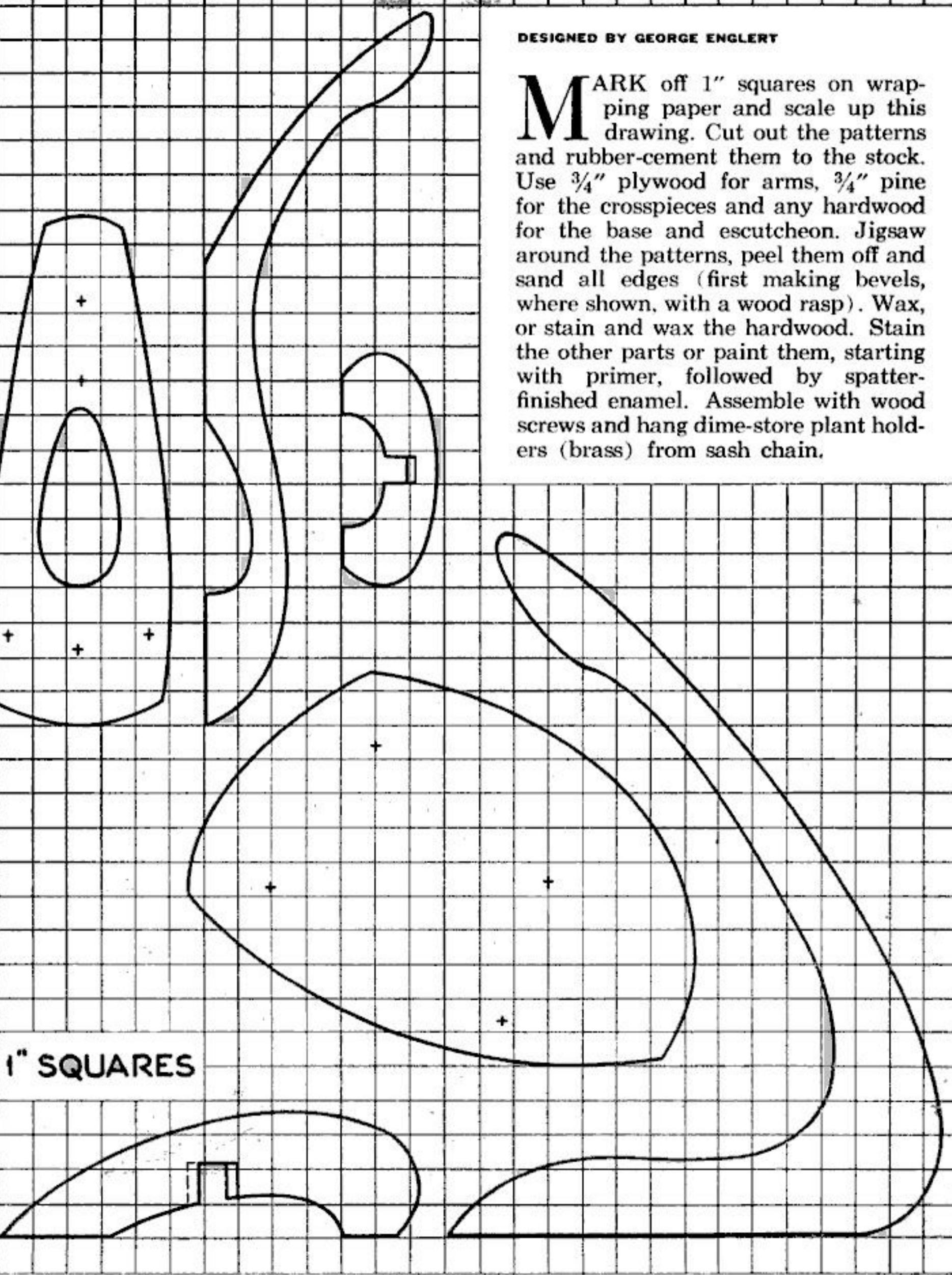
for



2 Modern Planters

DESIGNED BY GEORGE ENGLERT

MARK off 1" squares on wrapping paper and scale up this drawing. Cut out the patterns and rubber-cement them to the stock. Use $\frac{3}{4}$ " plywood for arms, $\frac{3}{4}$ " pine for the crosspieces and any hardwood for the base and escutcheon. Jigsaw around the patterns, peel them off and sand all edges (first making bevels, where shown, with a wood rasp). Wax, or stain and wax the hardwood. Stain the other parts or paint them, starting with primer, followed by spatter-finished enamel. Assemble with wood screws and hang dime-store plant holders (brass) from sash chain.



How to Build a Boat

By James A. Lockhart

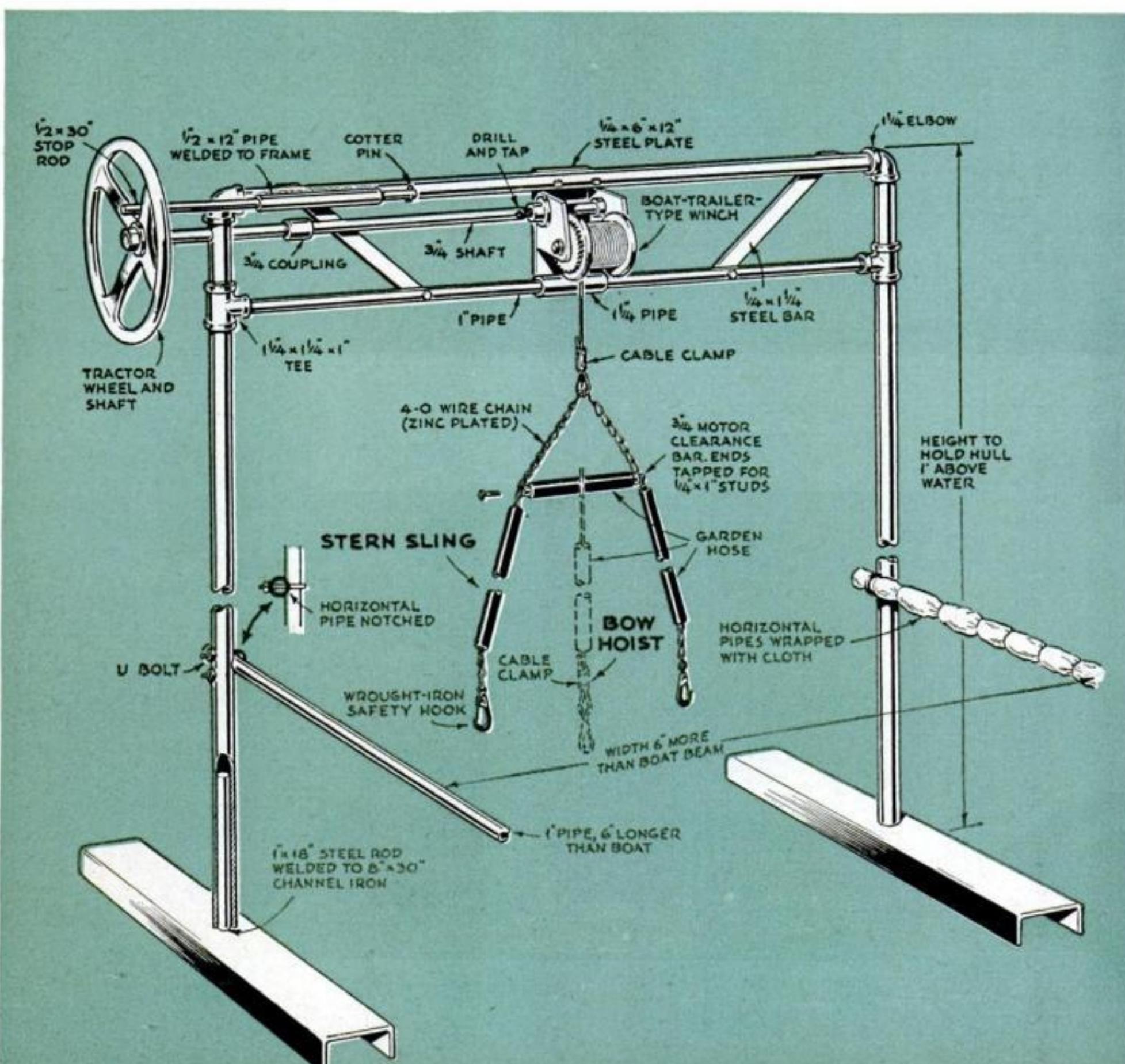
OTHER than a boat house, the best berth you can offer a runabout or express cruiser is a well-built hoist. With it you'll never again watch and worry while a small craft wallows at anchor during a storm, or beats her sides against a dock. She'll ride out gales high and dry.

You can build such a hoist, using iron pipe, scraps of steel plate, a pair of trailer winches and two tractor steering wheels. It will set you back much less than a comparable commercial job—around \$65 if you buy everything new; half that if you're willing to scrounge for junk.

The exact size of the hoist depends

upon the dimensions of the boat and the depth of water at the lift location. The ones shown in the photographs (I've built several for my lakeside neighbors) ran approximately 7½' high, 6½' wide and 15' between the end frames. The only welds are those that connect the 1"-by-18" pipe-leg standards to the channel-iron shoe plates, and a tacking job that attaches ½" sleeves to the top pipe members. These sleeves hold sliding rods that lock the winches by engaging spokes of the tractor wheels.

Depending upon the type of trailer winches used, bearings for the wheel shafts are either bored through the adjacent vertical pipe nipples, or provided by bolting pillow blocks to their forward

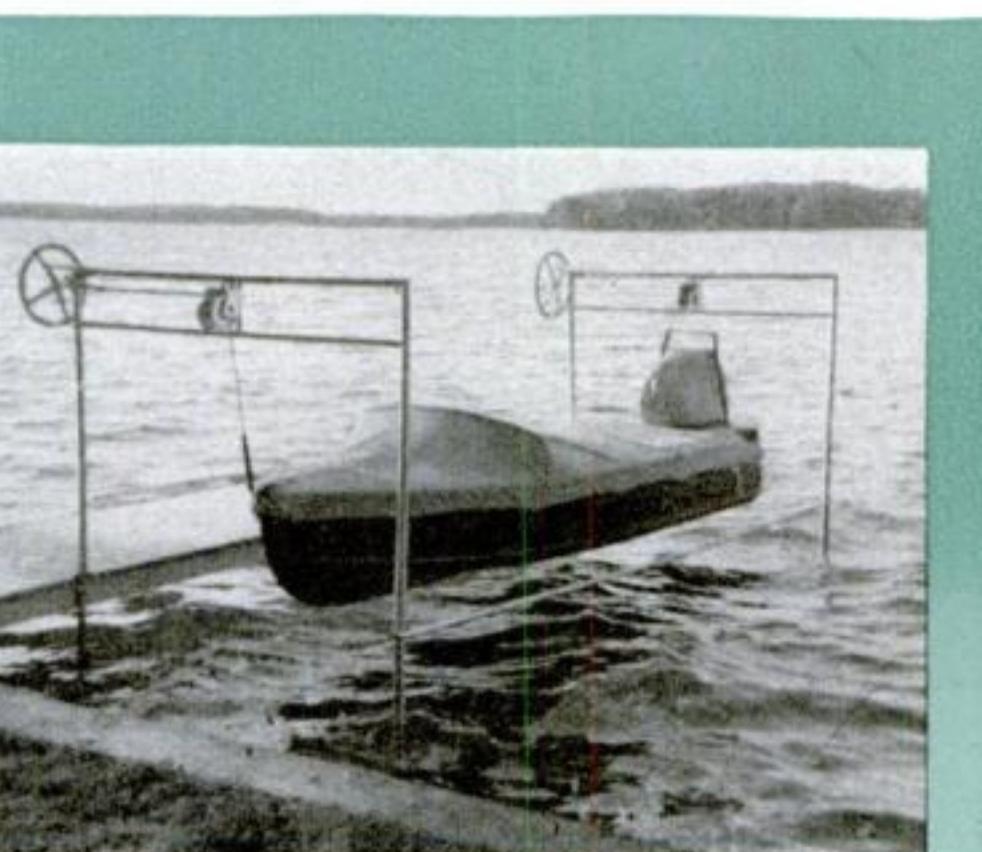


Hoist

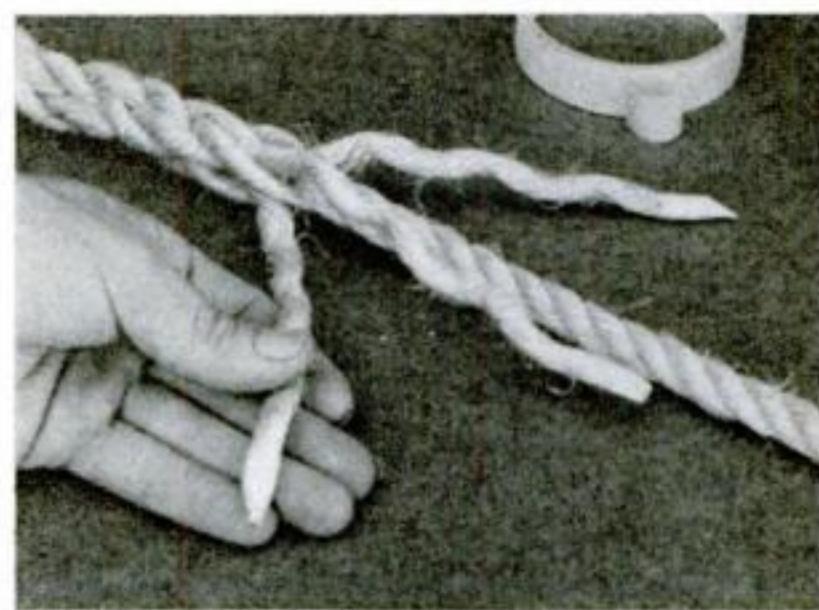
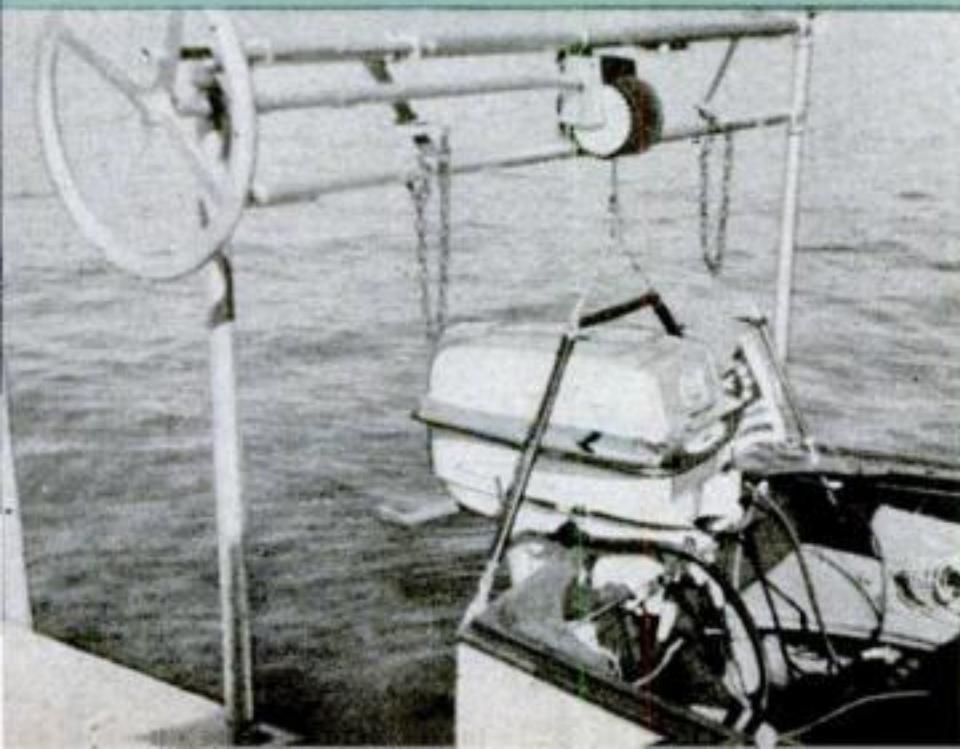
faces. With the pipe sizes and winches I used, my hoist will handle a boat weighing up to 1,200 pounds.

If the rig is set up adjacent to a pier, secure the uprights to the dock beams with U bolts. For a free-standing hoist, cut holes in the shoe plates and drive heavy shafting through them and into the lake or river bed.

In use, the bow- and stern-sling safety hooks are snapped onto wrought-iron or stainless-steel lift eyes attached to the boat. During lifting, maintain a nearly level keel. If you do the job alone, alternate between the wheels, locking one and going to the other each time one end is 5" or 6" higher than the other, until you finally level her off.

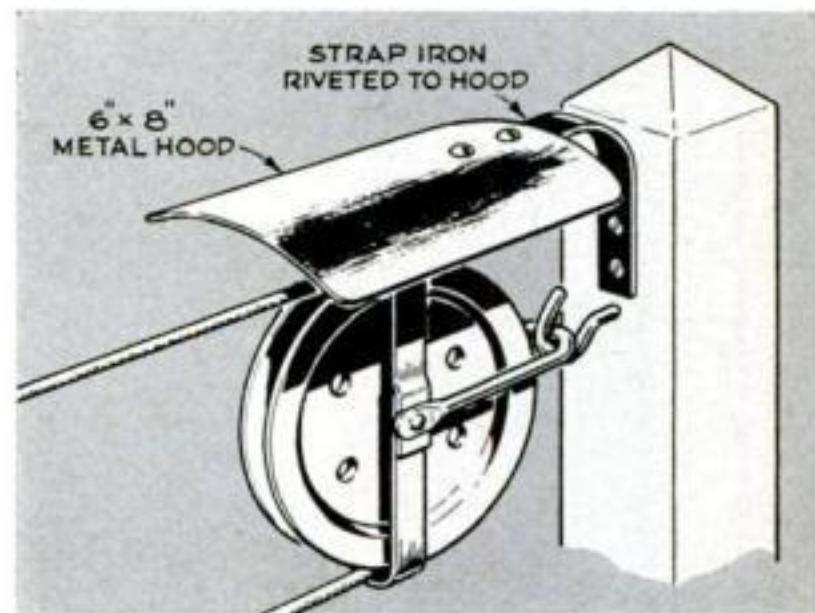


BOAT RIDES HIGH AND DRY on sturdy hoist. Plastic tubing or rubber hose slipped over the stern sling chains protect the motor (below). Fixed-position chains were added to this hoist to keep the boat from swinging sideways during heavy winds.



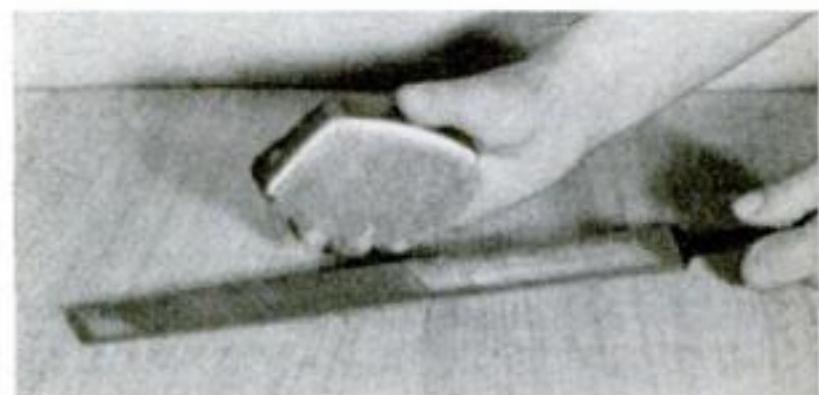
Splicing Rope with Tape

It's easier to insert the free ends of rope through the standing part if you tape the ends before splicing an eye or making a running splice. Wrap two or three times, leaving enough extending to press into a point. Masking tape does the best job and leaves no residue.—*W. A. Van Sandt, Hampton, Va.*



Hood for Clothesline Pulley

THE aluminum hood I made keeps our clothesline pulley from rusting and the wet line from freezing to the wheel.—*F. Genthner, Averill Park, N.Y.*

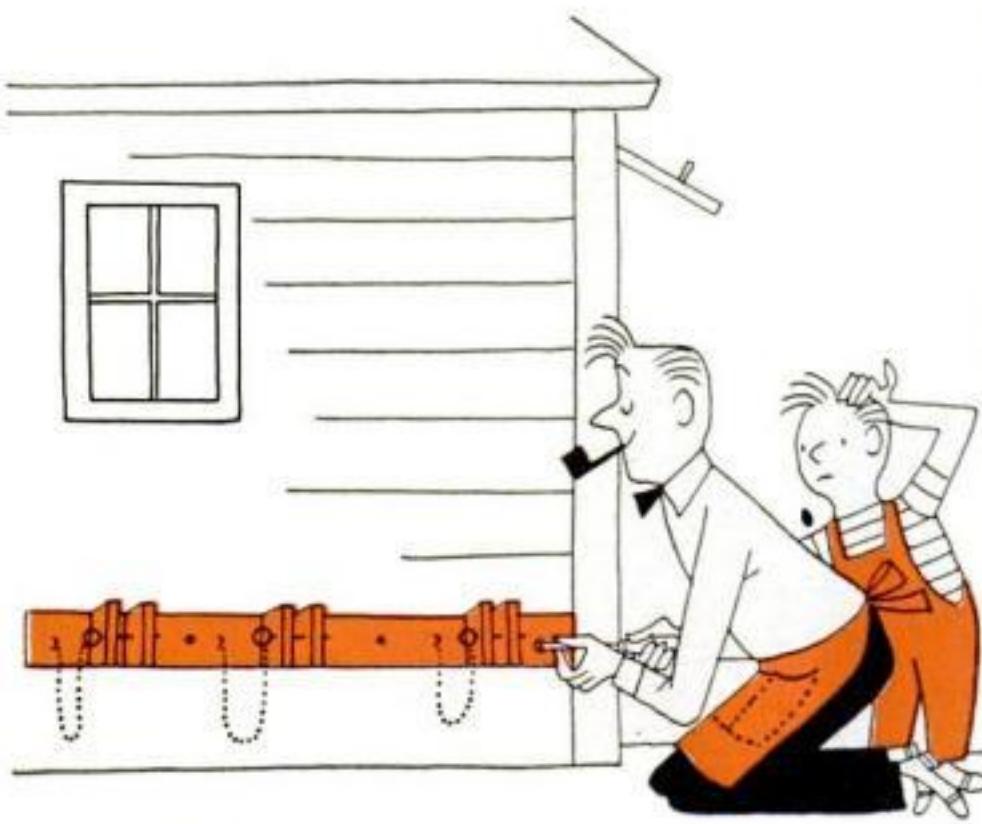
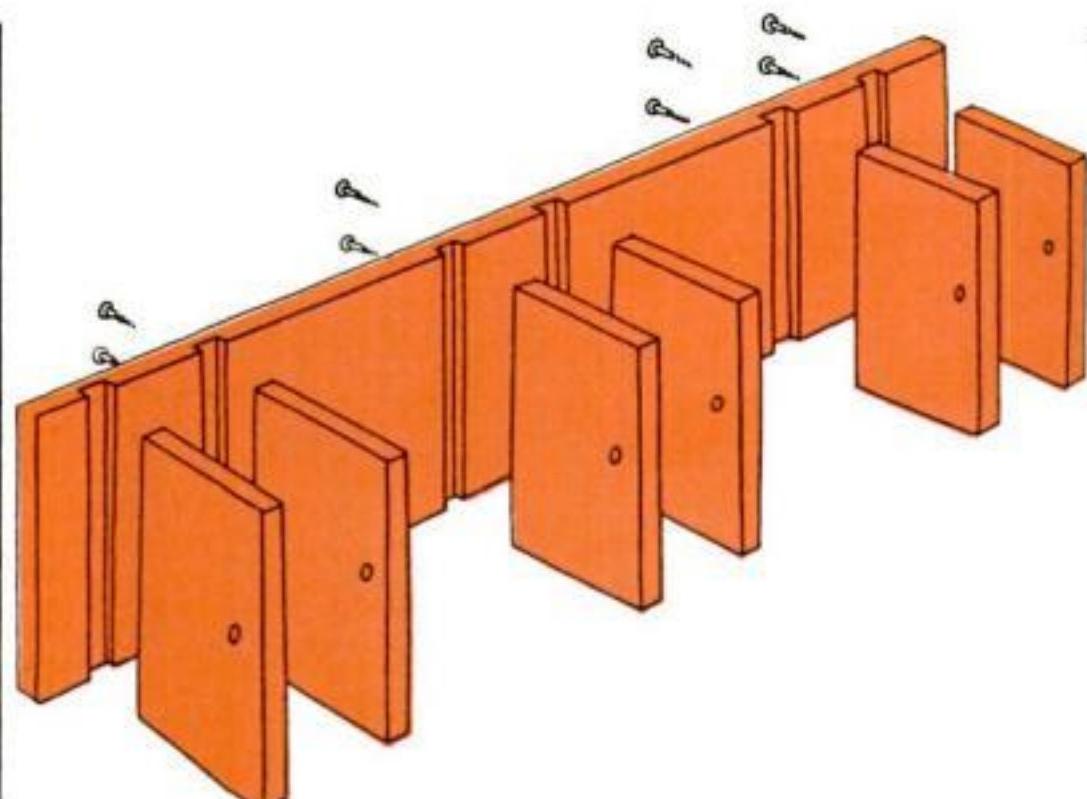


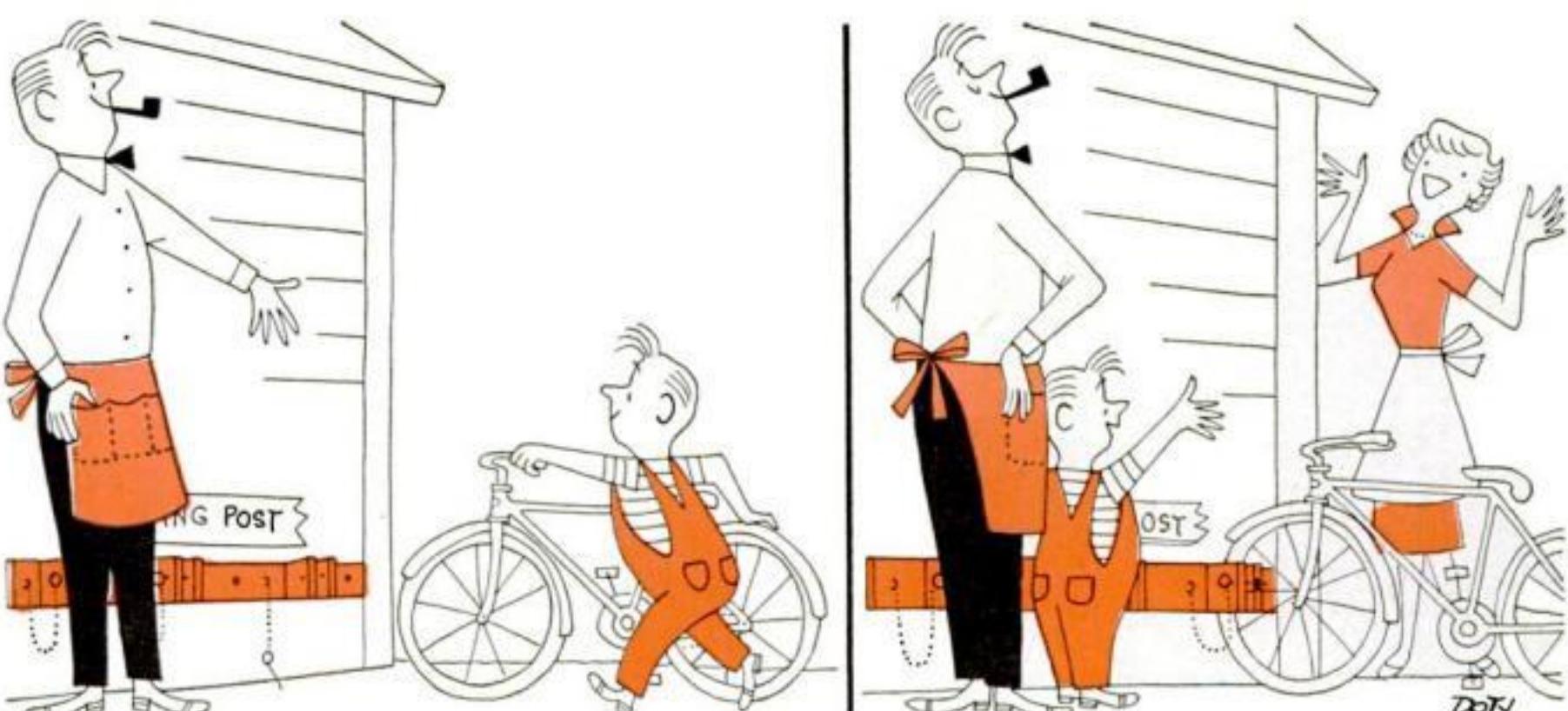
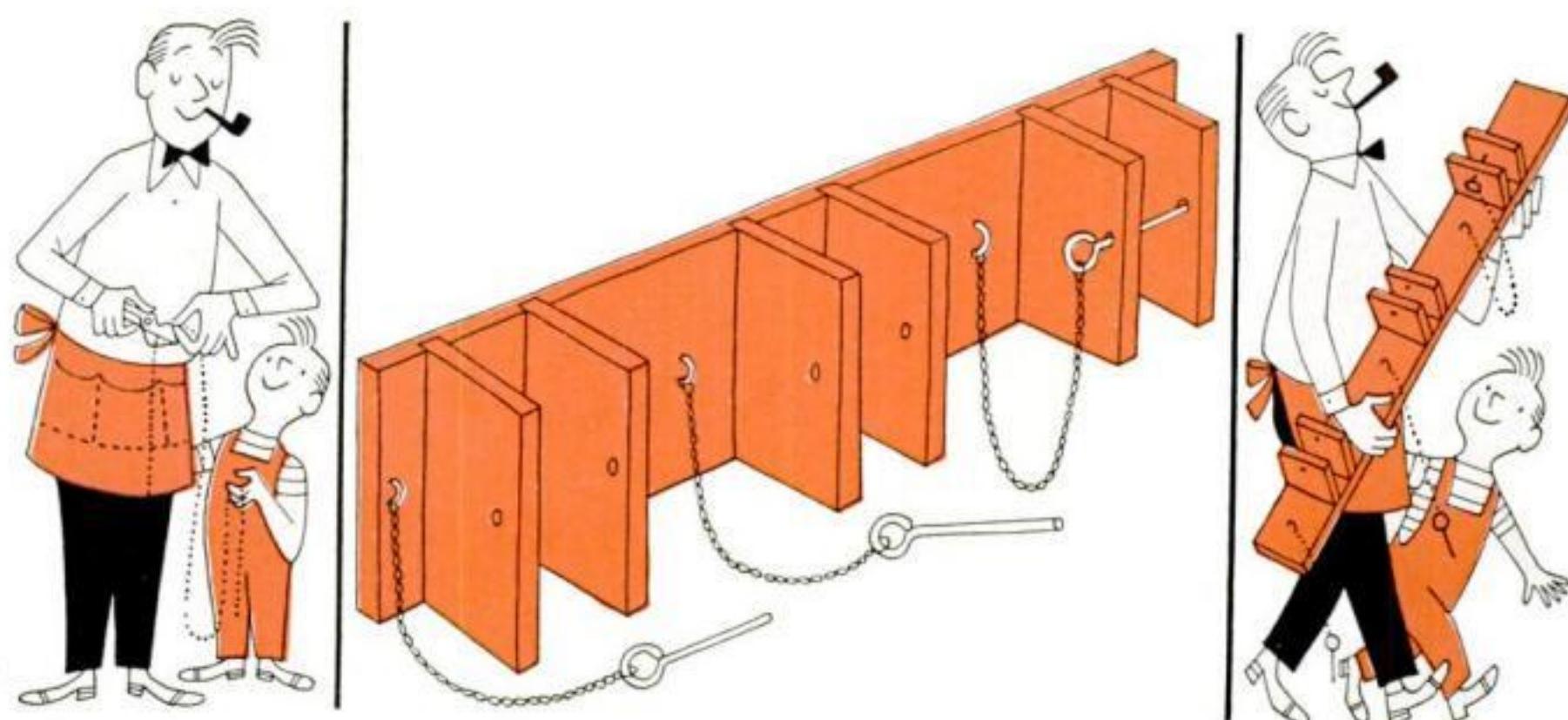
Handy Brush Cleans Files

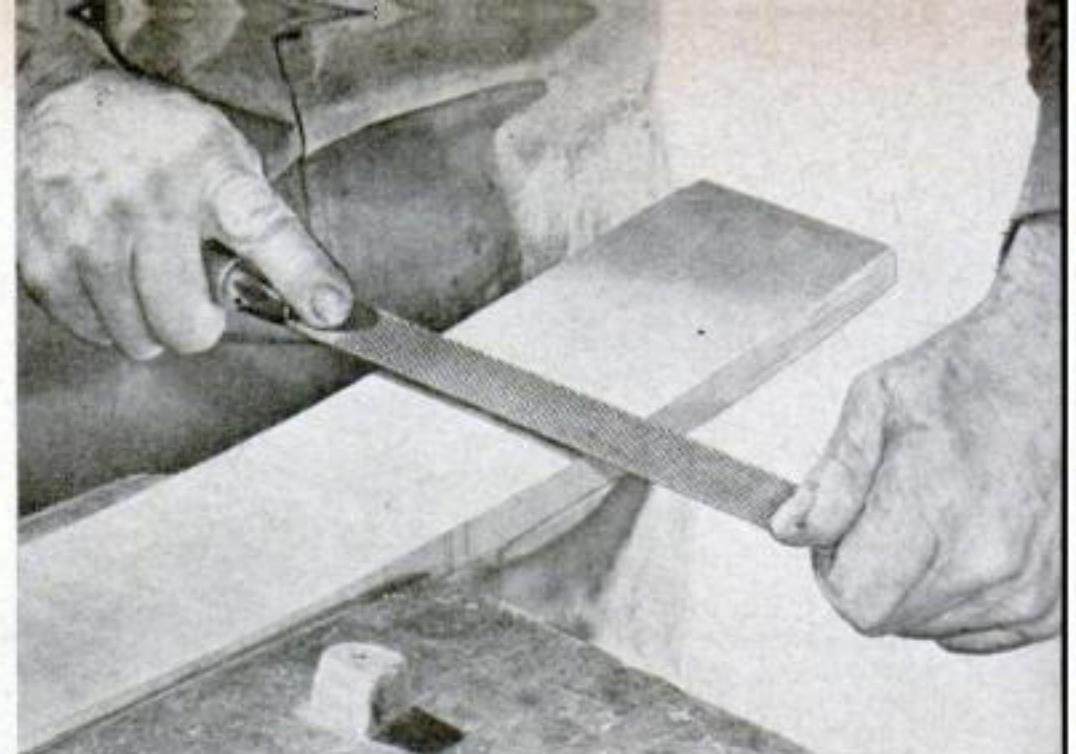
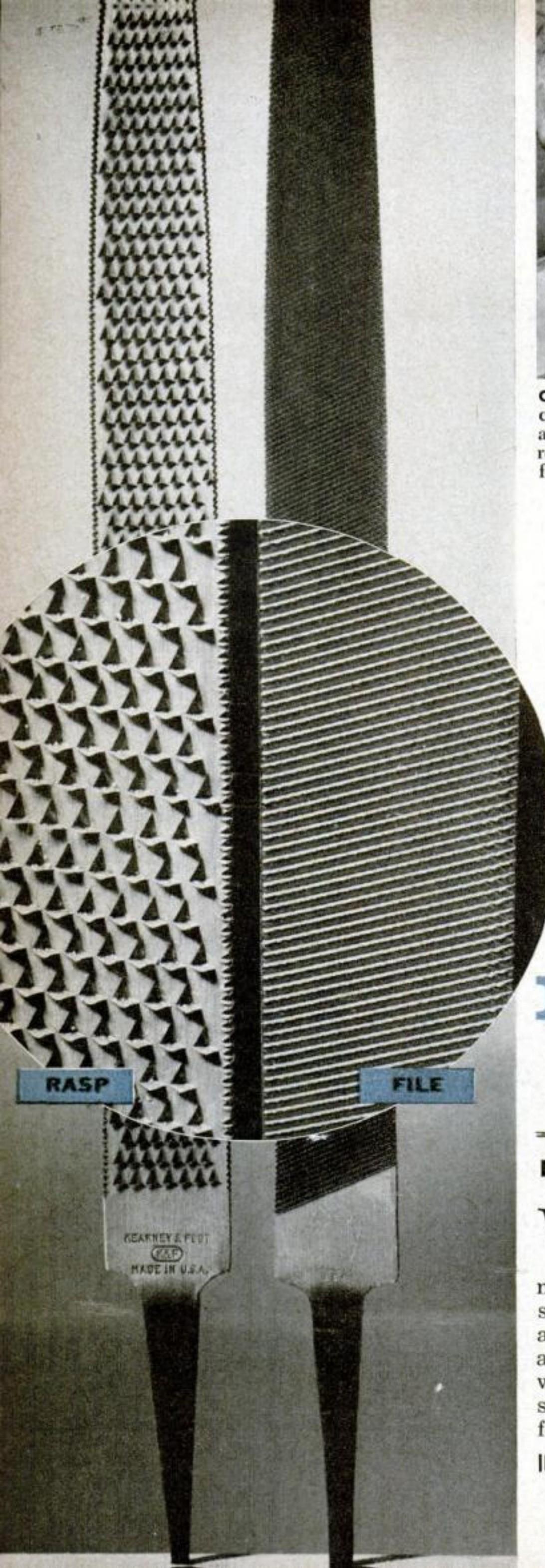
WHEN an old hairbrush becomes too worn to use, trim the bristles down with scissors and you'll have a card for cleaning the teeth of your files.—*Donald Spichuk, Brooklyn, N.Y.*

Wordless Workshop

By Roy Doty
and Arthur R. Tanner Jr.







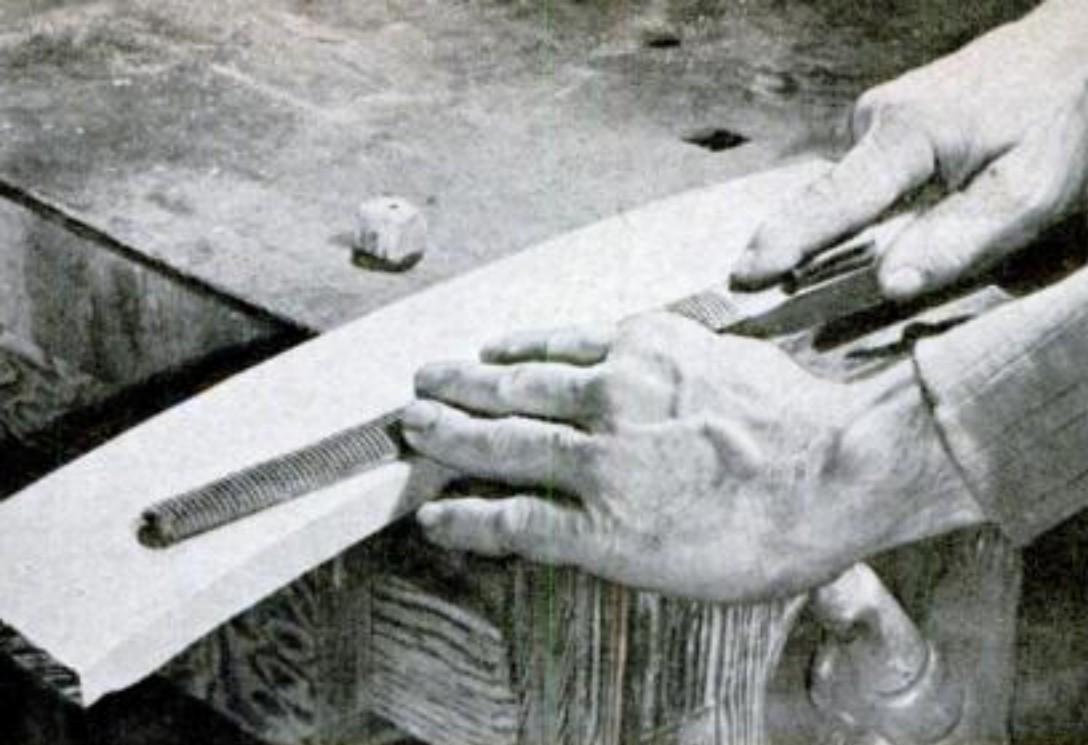
ON CONCAVE SURFACES like this bandsawed chair back, stroke across the work—at right angles when you're removing conspicuous irregularities—on a bias to produce a final, uniform curve. Finish smoothing with sandpaper.

*Awkward shaping jobs are
always easier if you know*

When and How to Use Wood Files and Rasps

By Edwin M. Love

WOOD rasps and files belong in any shop. Other hand and power equipment may seem to cover all needs, but there are times when those simple shaping and dressing tools will do a job faster and better. Cutting with or across the grain, a rasp husks off unwanted stock the easy way and a file smooths after it, readying the surface for sanding. They'll work in awkward



ON CONVEX SURFACES, rocking the tool in line with the grain irons out bumps. Press near the center of the tool to make the teeth bite effectively. If there's a great deal of stock that must be removed, rough with the rounded side.



SMALL NOTCHES AND INSIDE CORNERS are skipped by a shaper when molding or planing. The sharp edges of half-round rasps and files come in handy here: They make quick work of deleting saw marks in preparation for sanding.

places—overhead, in a corner, in cramped recesses. And for once-only chores such as chamfering a hole or rounding off a corner, rasping or filing takes less time than setting up a machine or making rough trim cuts with a chisel.

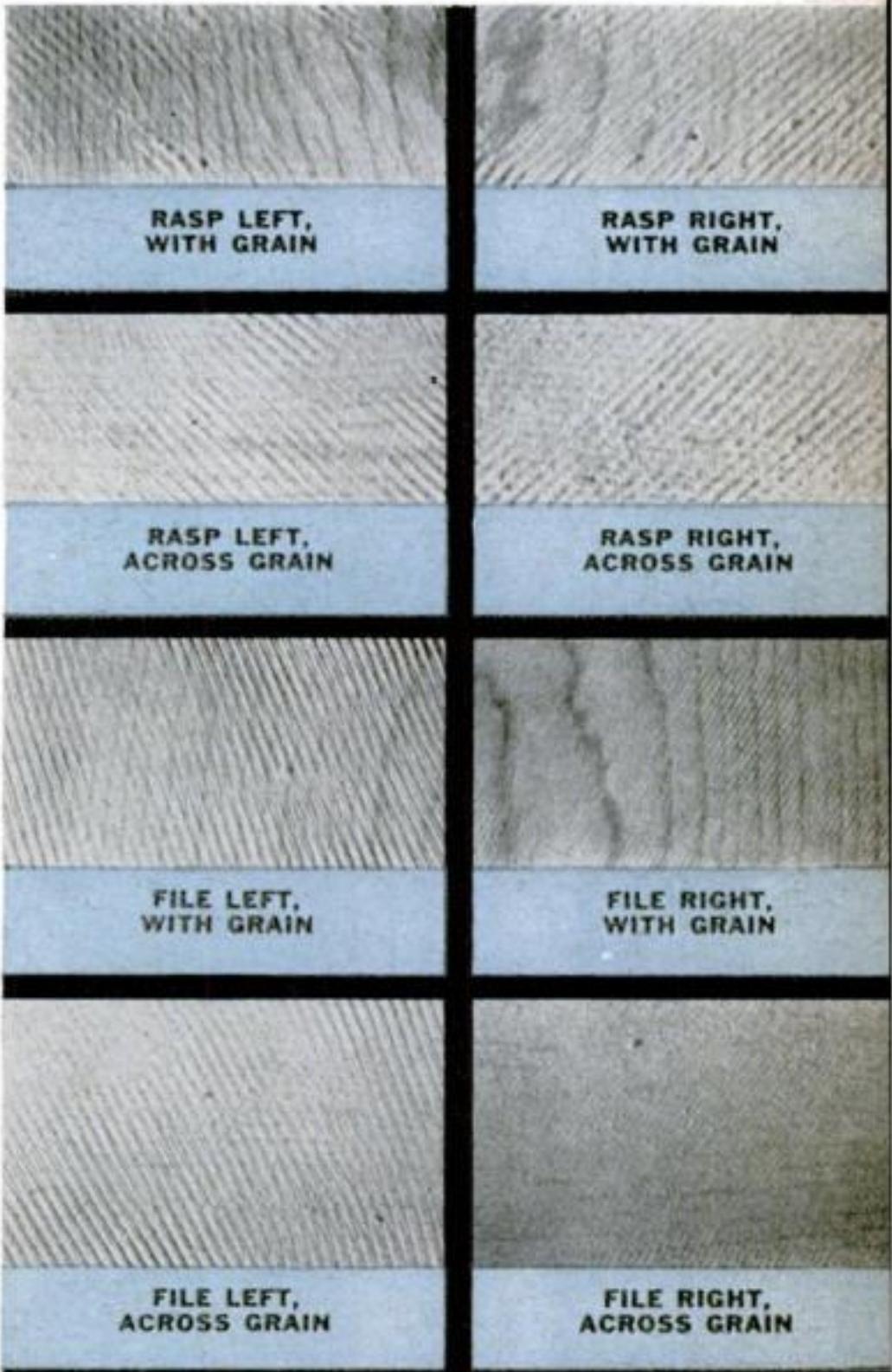
Apart from routine business, wood files are fine for such offbeat purposes as texturing a lamp base or deckling the edges of photographs. If you're copying an antique, they'll wear the edges convincingly.

What rasps and files? There's a bewildering array to choose from, but one rasp and one file will do most jobs. You'll want a rasp that cuts fast without tearing the wood to shreds. It must be suitable for shaping flat, arched or hollowed pieces. This calls for a half-round section having sharp edges that will reach into vees.

Select one of two kinds: either a 10" second-cut cabinet type, or a 10" pattern-maker's cabinet type. The latter is harder to come by, but if you're willing to wait for your hardware dealer to order one, and spend a bit more for it, you'll find it a better tool. Its specially staggered teeth do a really super job of whisking off unwanted wood.

Either a 10" or 12" half-round bastard file is your best bet for run-of-the-mill smoothing operations. Files with finer teeth clog rapidly.

But there are times when a woodworking project calls for smaller tools. A 6" half-round rasp and an 8" round cabinet



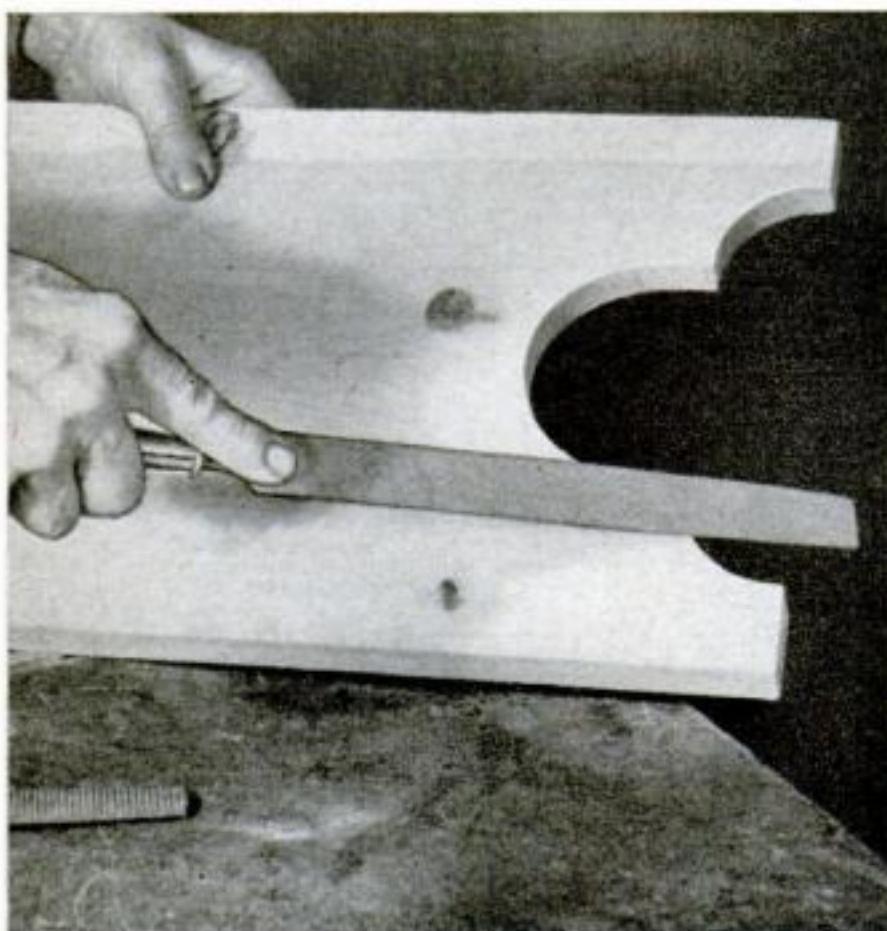
WOOD SAMPLES above tell the story: Rasps usually cut rougher and faster when slid to the right on forward strokes, smoother when slid to the left. Files cut faster when slid to the left, smoother when slid to the right—just the reverse.

rasp are handy for negotiating small curves. To smooth intricate scrollwork you can't beat a 6" XF Swiss-pattern round file. And for truing sharp interior angles, or preparing edges for fine sand-

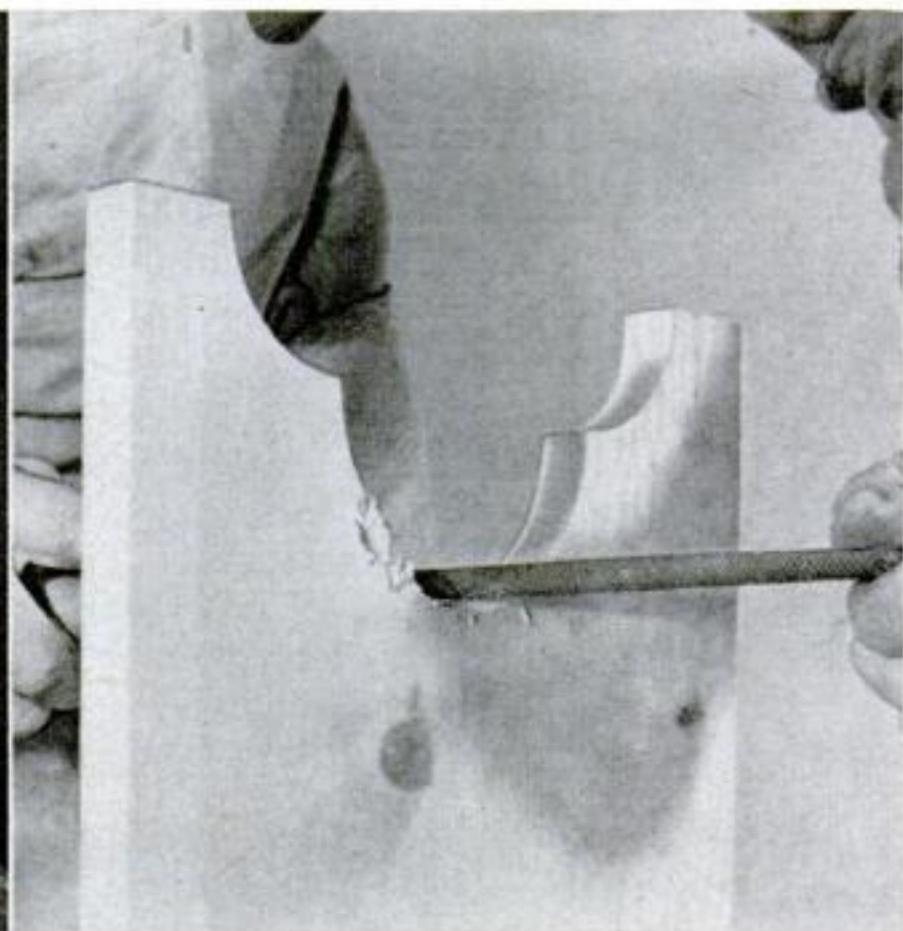
ing, consider the No. 00 Swiss knife file.

For a more comfortable grip and better working control, apply suitably sized handles of hardwood to the tangs of all your wood files and rasps.

More tricks and uses for rasps and wood files



SAWING BACK AND FORTH in one place produces bumps or scallops, but may also splinter the far side of a crosscut. Avoid this by chamfering the edges beforehand. Use light, sliding strokes of a file to form 45-degree bevels about



1/16" wide. Do the shaping or smoothing from the fancy side of the stock and, again, apply light pressure, letting the tool slide diagonally across the wood. On concave surfaces, always work with the rounded side of the file.



MODERN DOOR LOCKS should be easy to install when set in bored holes. But a slight error in measurement can cause a knob or bolt to bind. The simple cure is to shift the spindle hole a little bit with a small wood rasp or file.



MADE TO ORDER FOR ANTIQUING, rasps and files simulate worn edges when they are rocked at various angles while held flexibly in one hand. Avoid overworking; a few slight irregularities are better than heavy gouging.

END



Short Cuts and Tips

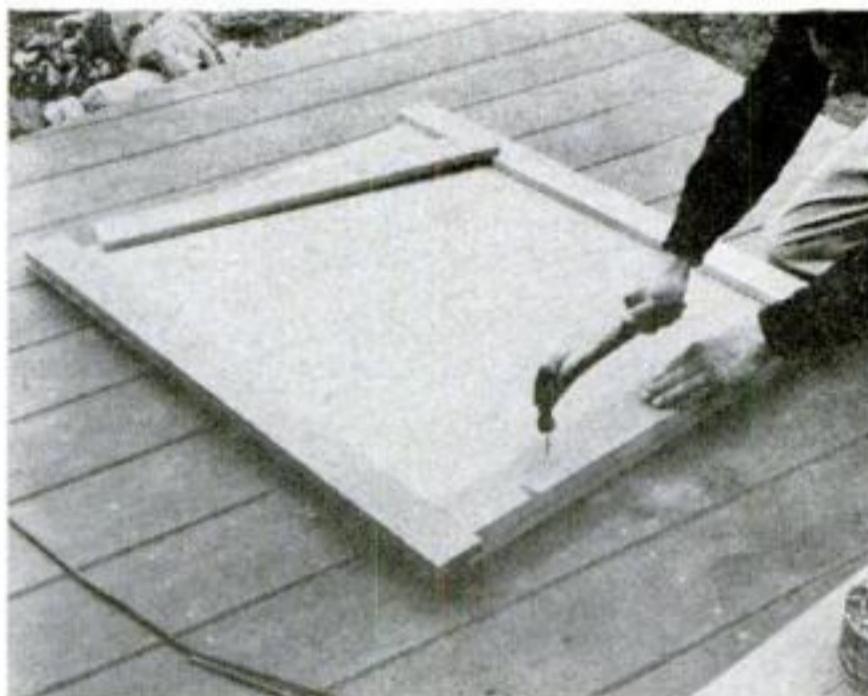
FROM PS READERS

Adjusting Refrigerator Lamp

NO NEED to crawl inside a refrigerator and close the door if you suspect the lamp isn't going out properly and its heat is actually defrosting while the motor works overtime to freeze. Just turn the radio high at a point where there is no station. If you hear a thump on the radio as you open and close the door, it's an electromagnetic "flash," indicating that the light is working. If you get no thump, try your thumb on the button switch. It may need a shim or two.—*George P. Pearce, Albuquerque, N. M.*

►►►WHEN a sewage drainage pipe started to back up on a Sunday when I couldn't find a plumber or buy a snake, I used a length of BX cable. It did just as good a job.—*John Riebl, Elmont, N. Y.*

Panel Door with Hand Tools



You can make a panel door without power tools simply by nailing a frame to the face and back of a sheet of plywood. Two-by-fours make a strong utility door; baseboard molding is better for a good, rich look.—*Jackson Hand, Westport, Conn.*

►►►IF you can't get paint to stick to a nickel ornament, try an undercoat of thinned shellac. This usually adheres well to metal, and paint clings to it.

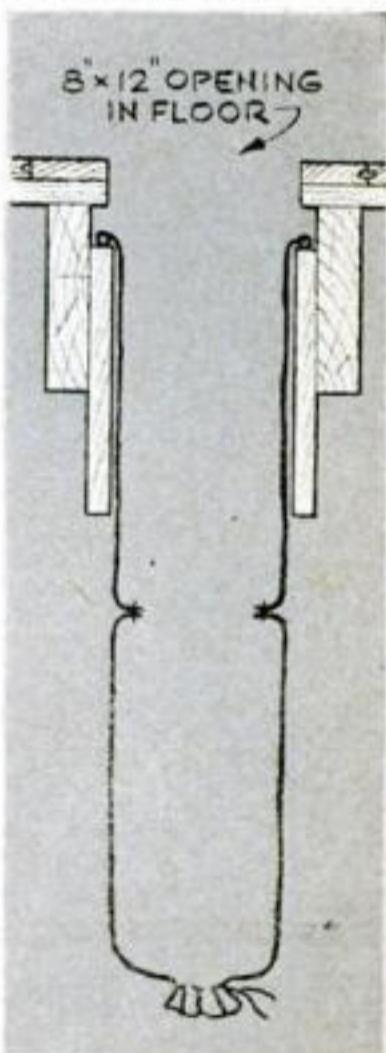
Clothes Chute into Laundry

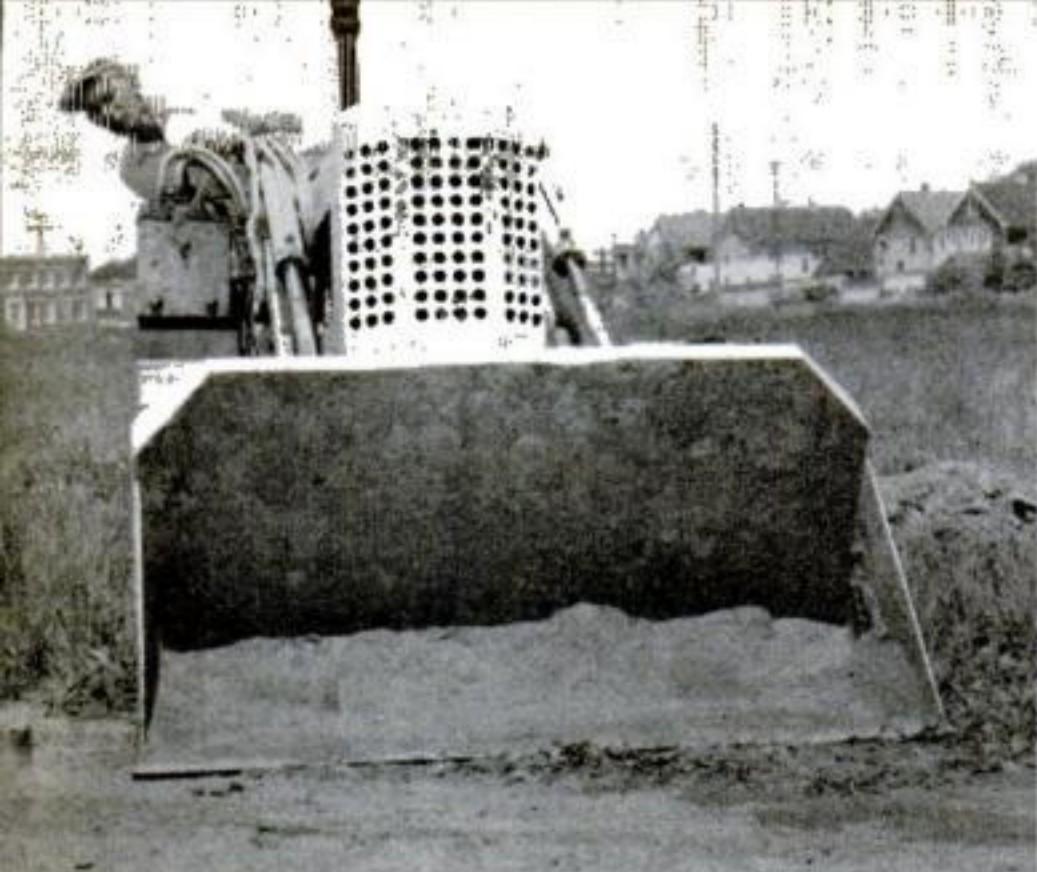
WITH a drill, a saw and two duffle bags, I rigged up a clothes chute through the floor above our basement laundry.

First, I cut an 8"-by-12" hole in the floor. Next I ripped the ends out of the duffle bags and sewed the bottoms together.

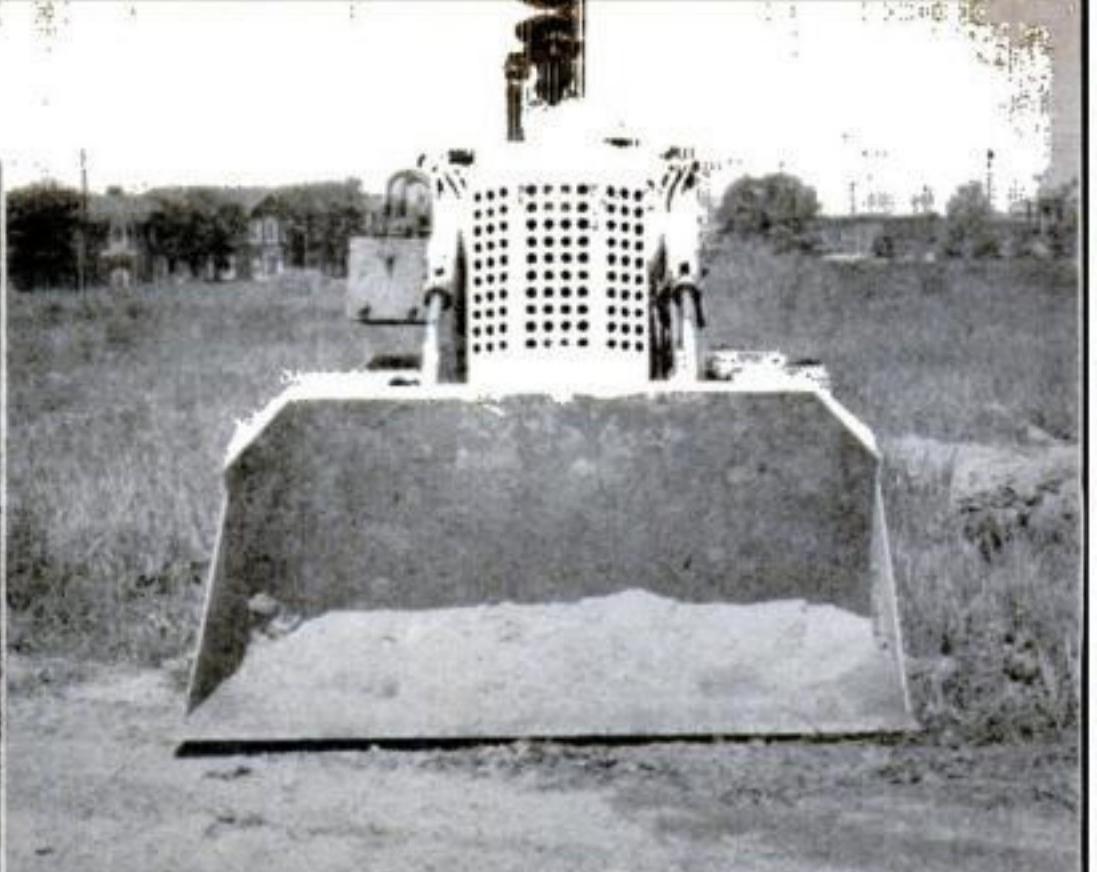
Then I removed the drawstring from one of the bags and inserted a heavy wire to keep it open and hold it over a wooden collar built just under the hole.

Finally, I covered the hole with a spring lid. Soiled clothes shoved down the hole are easily removed from the sleeve by loosening the drawstring at the end of the lower bag.—*Paul C. Kell, Charleston, W. Va.*





BEFORE: Contractor Alex Rychlic demonstrates the usual position of an operator trying to adjust depth of cut with a front-end loader.



AFTER: Sitting comfortably upright, he controls the grading level simply by keeping an eye on the arrows of the depth-control gauge.

Gauge Takes Guesswork

OPERATORS of front-end graders usually have a tough time positioning their buckets for fine grading. Cleveland contractor Alex Rychlic was no exception until he came up with a clever gauge that lets him drop the cutting edge to precisely the same position each time he makes a pass. With it there's no craning to see around the engine, no uncertain juggling of controls, no more corrugated cuts to level afterward.

Sitting comfortably upright, Rychlic simply lines up two arrows attached to the back of the bucket and whisks through his ground-leveling chores in 25 percent less time. That's a big return for the \$7.50 he spent on nuts and bolts, a half-inch-diameter turnbuckle, a couple of threaded rods, a tension spring and a few scraps of steel.

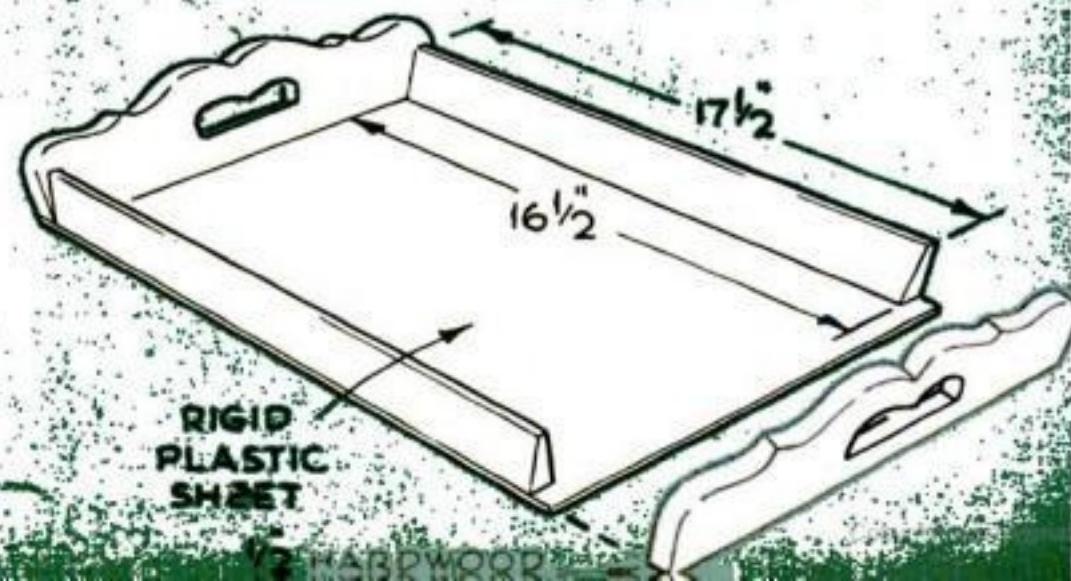
The gauge made from these parts works on a very simple principle. In load-

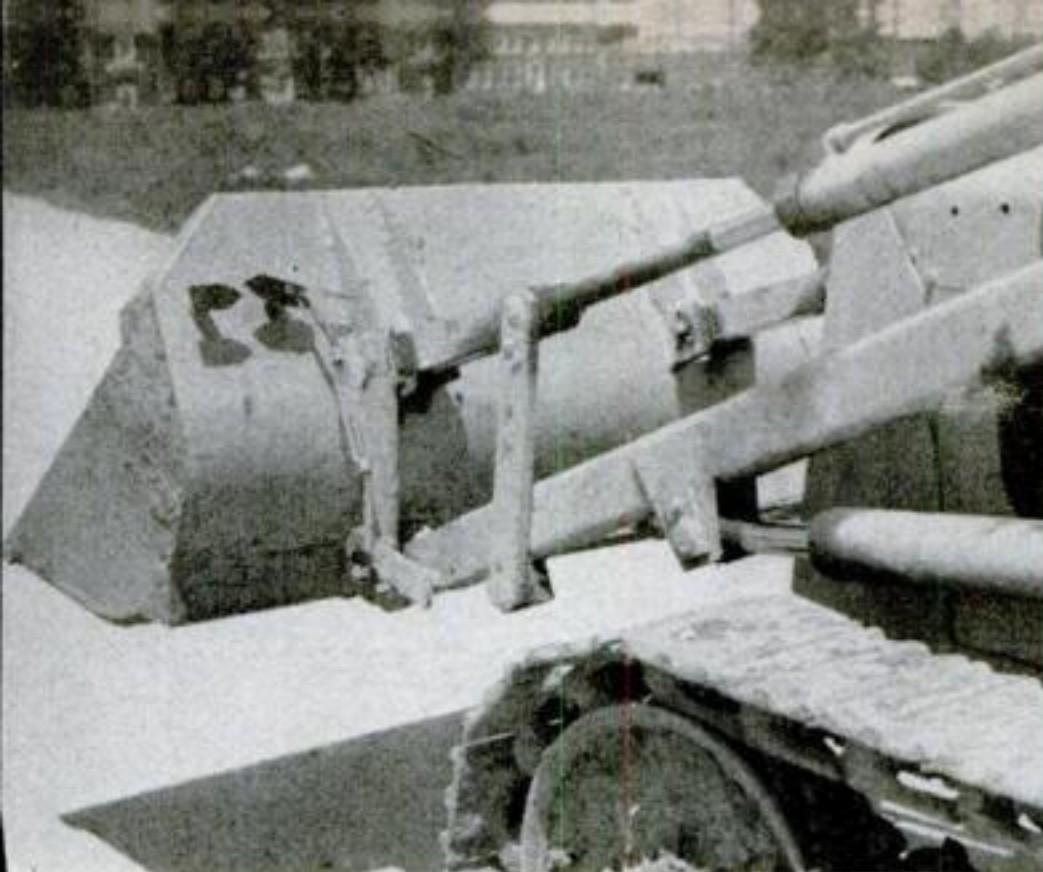
Tray Bottom Cut from



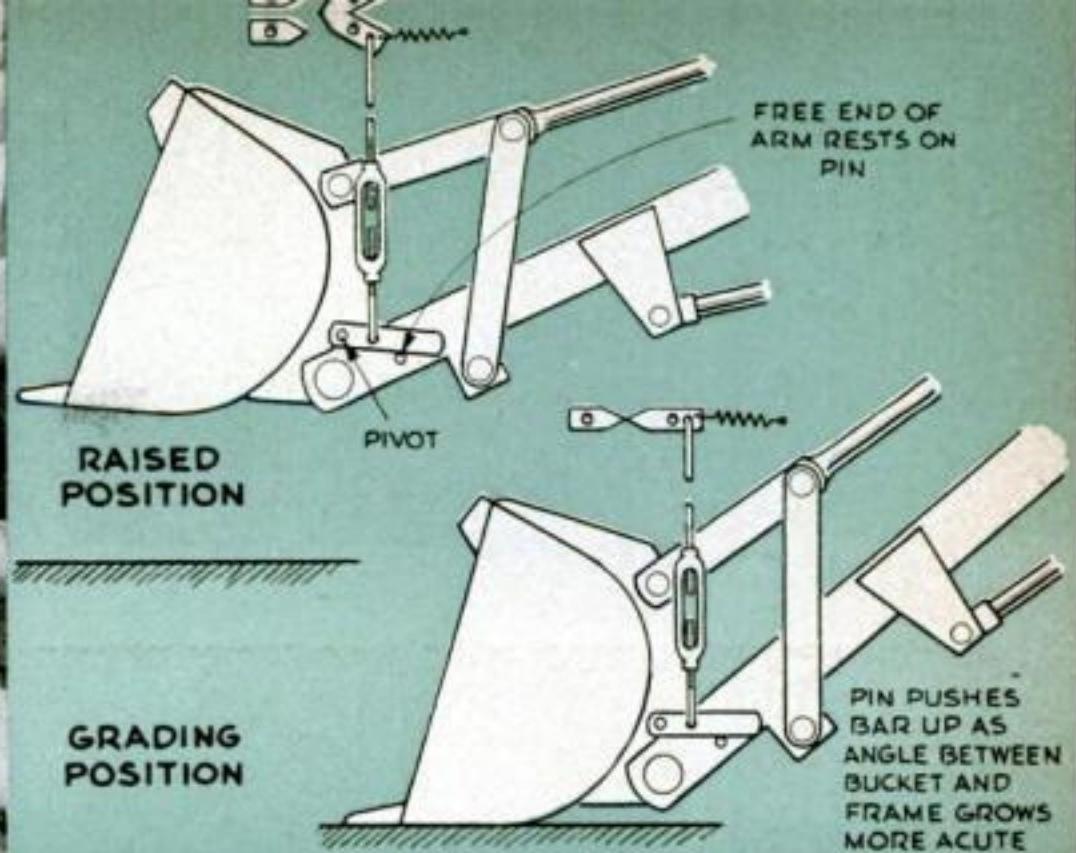
THIS simple serving tray has the colorful looks and durability of a kitchen counter—because that's just what it's made of. Its bottom is a small sheet of rigid plastic laminate of the Formica type. You can buy it inexpensively as scrap in colors to match an existing counter or in wood-grain finishes to harmonize with furniture.

Only four other parts are needed. Lay





MOVABLE ARROW POINTS UP and away from the stationary pointer when the operator raises the bucket, as you see in the photo and drawing



above. The operating rods, joined by a turnbuckle, are bent to clear the curved bucket back. Control linkage is diagrammed above.

Out of Grading

ing (raised) position, a fairly open angle is formed between the bucket and its frame. But as they are lowered to grading level the angle becomes more acute. By pivoting the forward end of a short steel arm on a bucket brace and letting the free end rest on a pin welded to the frame, this change of angle moves the arm up or down. The arm motion is transmitted, through the rods and turnbuckle, to a movable arrow.

Whenever Rychlic establishes the right depth of cut for a particular job, he adjusts the turnbuckle so this arrow lines up with a stationary arrow on the bucket back. Regardless of the number of times the frame is moved up and down after that, the cutting edge always returns to the same level when the arrow points jibe. A tensioning spring at the back steadies the movable arrow against slack.—Larry O'Rourke, Trenton, N. J.

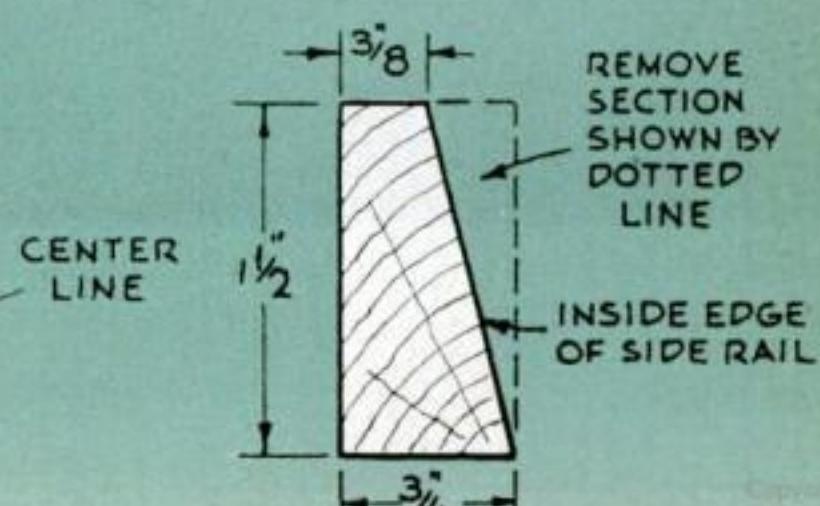
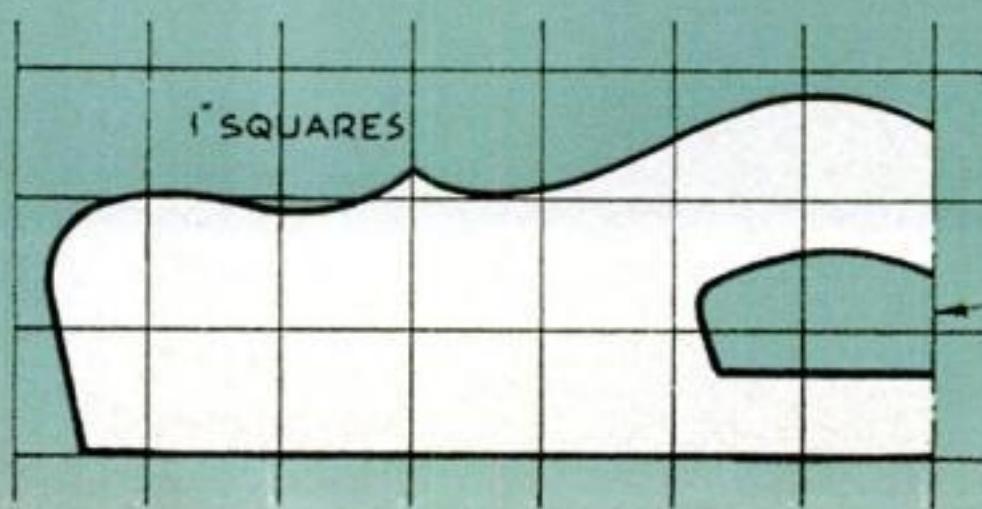
Counter Topping

out the design for the two end pieces on 1" squares and cut a half-width template from cardboard. Trace one half of each end piece on $\frac{1}{2}$ " hardwood, then flop over the template for an exactly matching second half and jigsaw the outline.

The two $\frac{3}{4}$ "-thick side rails could be left square, but are more graceful if you taper them as shown. The side rails are also 1" longer at the top than bottom to

give a stylish outward flare to the handles.

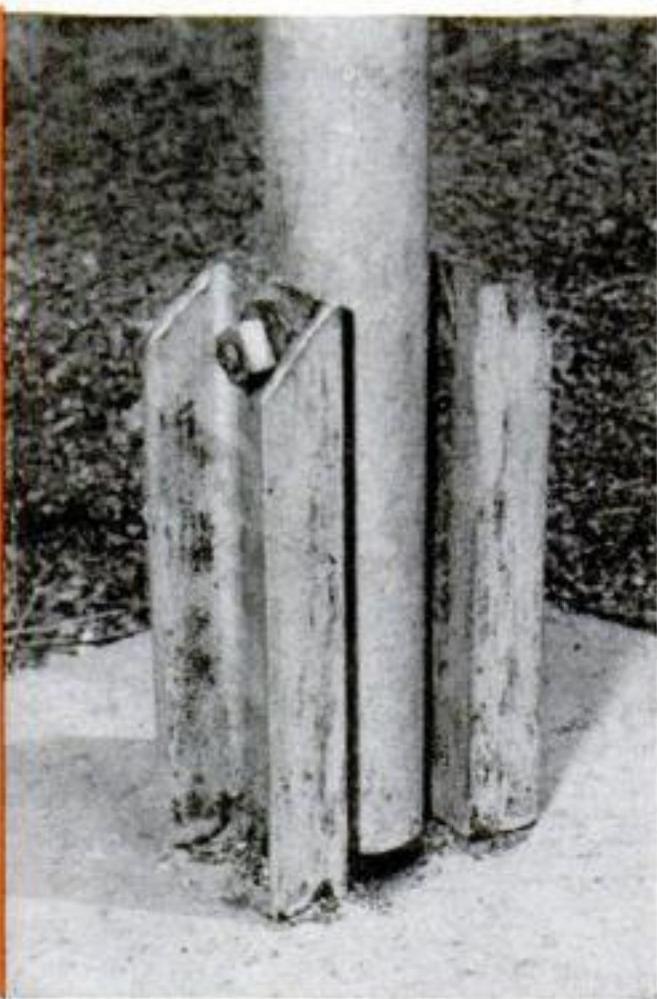
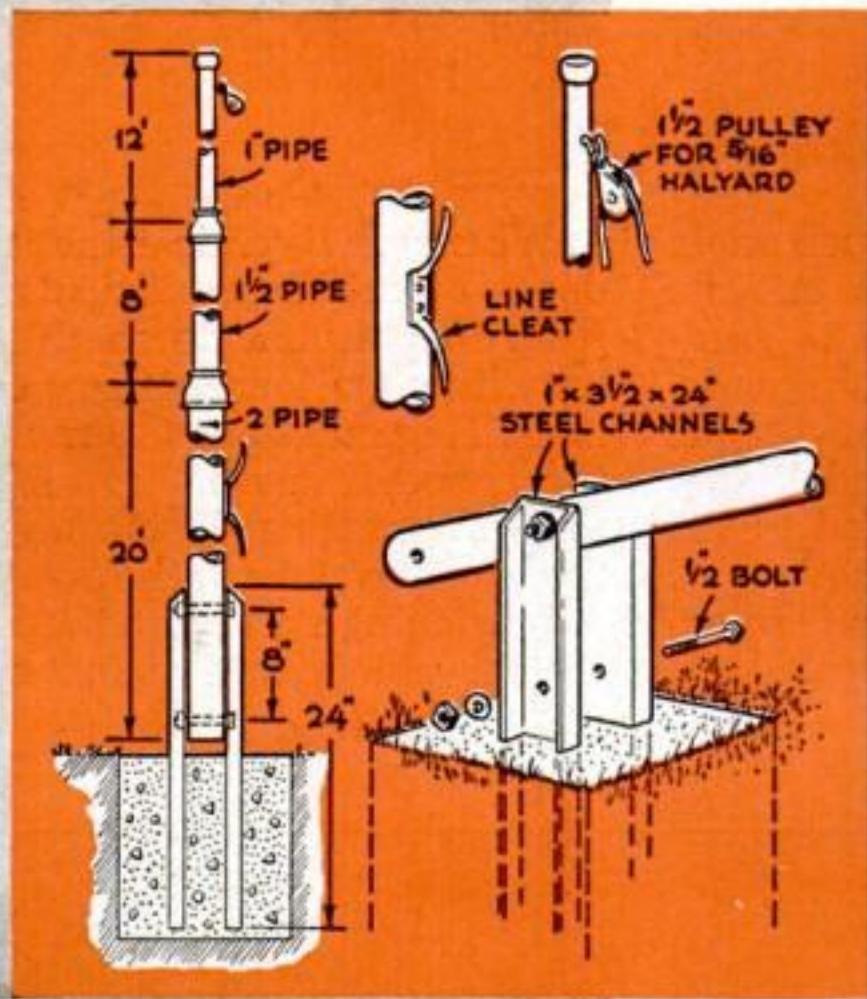
Fasten the wood parts with glue and countersunk brads. Trace the tray's outline onto the plastic bottom, but then jigsaw the plastic $\frac{1}{8}$ " narrower all around so its edges won't show. Fasten the bottom to the frame with small, flathead screws and drive in a rubber-headed tack at each corner for feet.—T. C. Van Alstyne, Don Mills, Ontario.



How to Put Up a Flag Pole



THREE lengths of graduated pipe, two reducers and a cap make a sturdy, 40-foot flag pole. The base is a 24-inch cube of poured concrete in which a pair of pole-flanking steel channels have been embedded. By removing one of the two bolts passing through them and the pole, the latter can be lowered to the ground to clear a fouled halyard. Eighty-five feet of rope, a bolted-on cleat, and a pulley and eyebolt complete the project.—*Hi Sibley, Nuevo, Cal.*



►►►A LUNCH box first shows signs of rust and paint chip on the inside seams. I avoid this by removing rust as soon as it begins, and repainting the seams with auto touch-up enamel. It also seals the seams against spilled coffee and other liquids.—*Carl L. Beddig, Oakland, Cal.*

►►►AFTER locking myself out of my house and then finding that a burglar had beaten me to a spare key hidden under the doormat, I thought of a new dodge that has served me well. I coated an extra key with paraffin and buried it in peat moss in a spot in the garden unknown to others.—*John Granger, Wood-Ridge, N.J.*

How to choose
THE
RIGHT
PAINT
for any job
around the house

*Buy the paint that's worth
the work...the beauty lasts!*



Better Things for Better Living
...through Chemistry

HOW TO USE THIS INFORMATION

Choosing the right paint for the job can be easy if you tuck these pages away for ready reference. For instance, you want to paint your basement walls. What is the best paint to use? You just get out these pages, turn to **INTERIOR PAINTING . . . Basement or Garage** and in a jiffy you have expert information. You know exactly what to ask for.

Any painting project takes time and effort; so it's a good idea to buy top-quality paint. Once the job is done, you want it to look professional and stay looking good for a long, long time! Your time is too valuable to take a chance on so-called "bargain" paints. When you consider that for only a little more you can have the best paint you can buy, you see why it's poor economy to skimp on the product. Quality paints cost more because they contain the finest ingredients, and because of the greater care in formulating and manufacturing. And those few extra cents can mean *extra years* of wear. When you buy Du Pont Paints, for instance, you know the beauty is going to last. Du Pont paint chemistry assures you of that.

Du Pont, with its unique position in the chemical field, has formulated finishes to meet almost every specific need. The information contained here is to guide you to the right type for your job.

Buy the paint that's worth the work . . . the beauty lasts!

INTERIOR PAINTING

CEILINGS AND WALLS

When do you need a PRIMER? A prime coat is needed over new or uncoated plaster, wallboard, etc., and over old, porous coats of paint. New plaster should be allowed to age 60 days before painting. Either of the following primers may be used: DU PONT PRIMER-SEALER, an odorless, foolproof oil-type alkyd primer that dries overnight; or DU PONT SEALER-COATER, a vinyl plastic primer that dries in 30 minutes, makes two-coat-a-day painting possible.



For THINNING most oil-type paints and cleaning brushes or equipment, unless otherwise specified, use "DULUX" ODORLESS THINNER. If odor is not important, you may use "DULUX" No. 200 BLENDING THINNER, mineral spirits or turpentine.

If you want a FLAT FINISH: "FLOW KOTE" RUBBER BASE WALL PAINT. Apply with brush or roller. Soft, velvety sheen. No "painty" odor. Truly washable. *Thinner:* water. *Primer:* none needed. *Drying time:* 30 minutes. May be recoated in 3 to 4 hours.

For a FLAT ENAMEL FINISH: DU PONT Wall Color ALKYD FLAT or Color Conditioning Flat Enamels. Oil-type alkyd. Odorless. Brush or roller. *Thinner:* see 2nd paragraph, above. *Primer:* see 1st paragraph, above. *Drying time:* hard overnight.



If you prefer SEMI-GLOSS: "DUCO" SATIN SHEEN ENAMEL. Oil-type alkyd. Odorless. Brush or roller. *Thinner:* see above. *Primer:* see above. *Drying time:* 6 to 8 hours. Dries hard overnight. May be recoated in 16 to 18 hours.

INTERIOR PAINTING



When you want a GLOSS FINISH, such as in a kitchen or bathroom: "DU CO" GLOSS ENAMEL. Oil-type alkyd. Odorless. Brush or roller. *Thinner:* see above. *Primer:* see above. In changing from a dark to a light finish, apply a first coat of "OVALITE" ENAMEL UNDERCOAT. *Drying time:* 6 to 8 hours.

And don't neglect the BASEMENT OR GARAGE: DU PONT BASEMENT WALL PAINT. A thixotropic paint, which means extra-thick, dripless consistency that needs no stirring. Ideal for painting ceilings and rough interior masonry walls since it doesn't drip or spatter. *Thinner:* water. *Primer:* none needed. *Drying time:* 30 minutes. Available in white and 8 colors. (Can also be used in any room in the house.)

All of the above are easy to apply, and dry to a hard, tough, durable, washable finish. Available in a range of colors.

WOOD FLOORS

If you want a PENETRATING FINISH: DU PONT PENETRATING WOOD FINISH. Use on new floors or old floors from which old finish has been completely removed. Leaves no surface film to wear off. Apply by brush, mop or rag. Wipe off surplus in 10 to 20 minutes. Let dry 3 hours between coats. Two coats required on most surfaces. May be waxed 3 hours after finish coat is applied.



To give floors a HIGH-GLOSS FINISH: "DULUX" INTERIOR VARNISH. Apply by brush. *Thinner:* "DULUX" 200 THINNER or turpentine. *Primer:* self-priming. *Drying time:* may recoat in 6 to 8 hours. Over shellac or lacquer use first coat of DU PONT 707 CLEAR WOOD SEALER.

If you want a PAINTED FLOOR: DU PONT PORCH AND FLOOR ENAMEL. Apply by brush. *Thinner:* "DULUX" 200 THINNER, turpentine or mineral

spirits. *Primer*: self-priming. *Drying time*: overnight. One or more coats required.

IMPORTANT: be sure to remove wax and polish before attempting to refinish any floor.

For CONCRETE FLOORS, above grade, use: DU PONT PORCH AND FLOOR ENAMEL, same as PAINTED FLOORS.

For CONCRETE FLOORS, below grade: DU PONT ALKALI RESISTANT ENAMEL. Chlorinated rubber formula resists damage due to dampness from beneath floor. Apply by brush or roller. *Thinner*: "DULUX" 200 THINNER only. *Primer*: self-priming. *Drying time*: 4 to 5 hours, permitting two coats in one day.

FURNITURE

Do you have to REMOVE THE OLD FINISH? No, if it is in good condition and the rough sections can be sanded smooth. If your surfaces are too badly scarred, use DU PONT PAINT AND VARNISH REMOVER. Heavy-bodied, it "stays put" on vertical surfaces. Old finish washes away with water. Nonflammable. Follow directions on can.



Wood Furniture—Painted

For a sparkling GLOSS or velvety SEMI-GLOSS FINISH: "DU CO" ENAMEL. **Undercoat:** for new wood, or changing from dark to light color, use "OVALITE" ENAMEL UNDERCOAT.

Wood Furniture—Clear Finish

There are so many different kinds of wood, and methods of finishing, that this subject is covered in complete detail in our booklet, "How to Finish with Wood Stains." Ask your Du Pont Paint Dealer for a free copy.

INTERIOR PAINTING

Wood Furniture—Clear Finish—Cont.

This booklet tells you how to use these products:

DUPONT CLEAR WOOD SEALER, for sealing open-grained woods.

DUPONT SATIN SHEEN STAIN, for rich natural wood or color effect.

"DULUX" SATIN SHEEN VARNISH, for rich "hand-rubbed" topcoat.

DUPONT PENETRATING WOOD FINISH, for extra-durable penetrating type finish.

"DULUX" INTERIOR VARNISH, for fast-drying, extra-long-wearing gloss finish.

705 SUPER-CLEAR VARNISH, for durable high-gloss finish.

Ask your dealer for this booklet, which gives you complete instructions on how to finish and refinish fine wood furniture.



METAL FURNITURE

PRIMING of metal is important. For bare metal, prime with "DUKO" METAL PRIMER. Previously painted metal should be carefully sanded, and bare spots primed with "DUKO" METAL PRIMER. Apply by brush. Dries for enamel coat in 4 to 6 hours. *Thinner*: "DULUX" 200 BLENDING THINNER or turpentine.

For a GLOSS FINISH, indoors or out: "DUKO" GLOSS ENAMEL. For a SEMI-GLOSS finish indoors, use "DUKO" SATIN SHEEN ENAMEL.

PUSH-BUTTON PAINTING

The modern, convenient way for painting small objects and hard-to-get-at surfaces is push-button painting with "DUKO" SPRAY MAGIC ENAMEL. For wood or metal surfaces, indoors or out. Available in a wide variety of colors, Black, Appliance White, Clear, Silver, Gold and Primer-Undercoat.



WOODWORK

For FINISHING WOODWORK, the same products are used as for finishing furniture on the preceding page. For GLOSS enamel: "DUKO" GLOSS or "DULUX" SUPER WHITE ENAMEL. For SEMI-GLOSS: "DUKO" SATIN SHEEN ENAMEL or "DULUX" SUPER WHITE EGGHELL. For FLAT finish: DU PONT ALKYD FLAT or "DULUX" SUPER WHITE FLAT ENAMELS. Also ideal for woodwork: COLOR CONDITIONING GLOSS, SEMI-GLOSS AND FLAT ENAMELS. FOR CLEAR finishes: see FURNITURE.



CUSTOM COLOR

Want to match a very special color? Ask your Du Pont Paint Dealer to show you DU PONT CUSTOM COLORS. Over 600 stunning colors to match any color scheme. You can start with your basic room color—the rug, the drapes, or the furniture—and select matching or harmonizing DU PONT CUSTOM COLORS to bring out the full beauty of the room.

This almost limitless range of colors is available in GLOSS, SEMI-GLOSS and FLAT ALKYD ENAMELS, and RUBBER BASE FLAT WALL PAINT. See the beautiful display of colors at your Du Pont Paint Dealer's and use his new DU PONT COLOR SELECTOR to assure you perfect color harmony.



NEW DU PONT "LUCITE" ACRYLIC HOUSE PAINT LASTS 50% LONGER!

Dries in 30 minutes—protects against blistering

Here's the greatest paint discovery since Du Pont quick-drying auto finishes! It's DU PONT's new "LUCITE" ACRYLIC HOUSE PAINT. You thin it with water! And it's so durable it lasts 50% longer than ordinary paints!

A product of years of Du Pont research, DU PONT "LUCITE" ACRYLIC HOUSE PAINT is an entirely new kind of exterior paint. It is recommended for use only over No. 38 BLISTER RESISTANT WOOD PRIMER on new wood or on old surfaces from which the finish has been completely removed. While exposure panels and test houses indicate that the same advantage of longer life can be expected when "LUCITE" HOUSE PAINT is applied over firmly adhering old finishes that are in good condition for repainting, further experience is needed before such use can be definitely recommended.

SOLVES BLISTERING PROBLEM

The chief cause of house paint blistering is moisture trapped beneath old-style paint films which cannot "breathe." The combination of the new No. 38 PRIMER and "LUCITE" HOUSE PAINT is chemically engineered to allow moisture vapor to breathe through while shutting out water penetration from the outside.

EASIEST APPLYING PAINT EVER

"LUCITE" ACRYLIC HOUSE PAINT flows on smoothly, evenly, even over damp surfaces. It dries in 30 minutes, hence no problem with bugs and dirt. And it's ready for a second coat in one hour!



Plus that, it does not "run down" or discolor dark walls, masonry. Its long-lasting velvety sheen helps hide surface imperfections. One coat covers, two give maximum protection and durability. And it's so easy to clean up. Fresh paint spots wipe off with a damp cloth. Soap and water clean your brushes. Now ready for immediate delivery at your DuPont Paint Dealer's. Find his name in the Yellow Pages of your phone book.

EXTERIOR PAINTING

The revolutionary new "LUCITE" ACRYLIC HOUSE PAINT system is described on the preceding page. The House Paints described below are oil-type paints which have long enjoyed the confidence of painters, architects and home owners for their ease of application, durability, fade-resistance and long-lasting good appearance.

When do you need a PRIMER? Bare WOOD SURFACES or any surface from which the old paint has been removed should be primed. Badly weathered paint should be sanded thoroughly and the entire surface primed. Use DU PONT No. 39 WOOD PRIMER. (Certain DuPont House Paint Colors are self-priming. Be sure to follow directions on the can.)

All bare METAL should be primed with recommended DU PONT METAL PRIMER. For copper, bronze or galvanized metal downspouts, gutters, flashings and fittings: "DULUX" GALVANIZED METAL PRIMER. For such aluminum surfaces: a thin coat of DU PONT HOUSE PAINT (No. 40, 41 or 42).

Painting a clapboard, plank or plywood house? DuPont House Paints are available in a wide variety of colors, as well as in the specific White House Paints listed below.

DU PONT No. 40 OUTSIDE WHITE: a self-cleaning house paint for the all-white wood house.

DU PONT No. 41 OUTSIDE WHITE: for those who wish to use a lead-formula house paint.

DU PONT No. 42 CHALK RESISTANT HOUSE PAINT: white, for use above masonry or dark colored areas. May also be tinted to light shades, using DU PONT CUSTOM TINTING COLORS.

Painting a stucco, brick or masonry house? DU PONT STUCCO, SHAKE & SHINGLE PAINT: white and colors. Easy to apply, quick drying; or DU PONT VINYL MASONRY PAINT, where available (in southern U. S. states).



For all TRIM, SHUTTERS, etc. For painting shutters or trim on any type of house, use DU PONT TRIM & SHUTTER PAINT. Quick drying, fade and mildew resistant; or No. 42 CHALK RESISTANT WHITE or DU PONT HOUSE PAINT COLORS.



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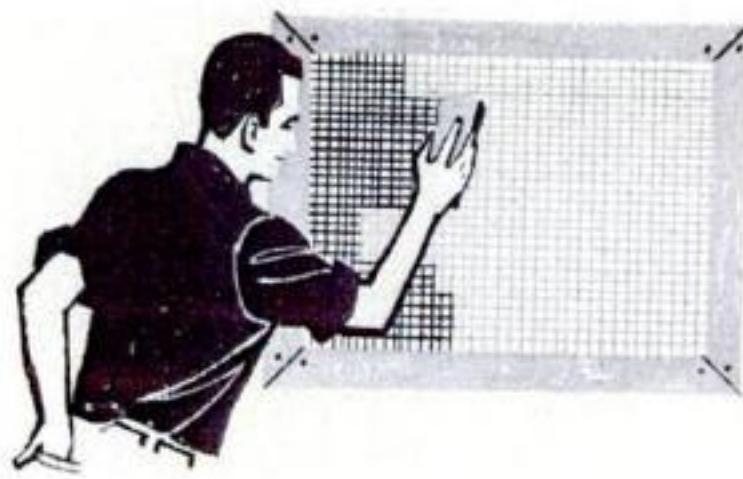
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EXTERIOR PAINTING

Painting OUTDOOR FURNITURE? For painting wood or metal furniture to be used outdoors, use "DUKO" GLOSS ENAMEL or DU PONT TRIM & SHUTTER PAINT. For priming and undercoating instructions, see section on INTERIOR PAINTING—*Furniture*.

Painting SCREENS? Paint screen frames with same product used in window frames. If a contrasting color is desired: "DULUX" TRIM & SHUTTER PAINT. For black frames and screen wire, use DU PONT SASH & SCREEN PAINT—BLACK. To retard copper SCREEN STAINING: paint screen wire with "DULUX" EXTERIOR SPAR VARNISH. Apply at least two coats.



10 DOS AND DON'TS IN BUYING PAINTS

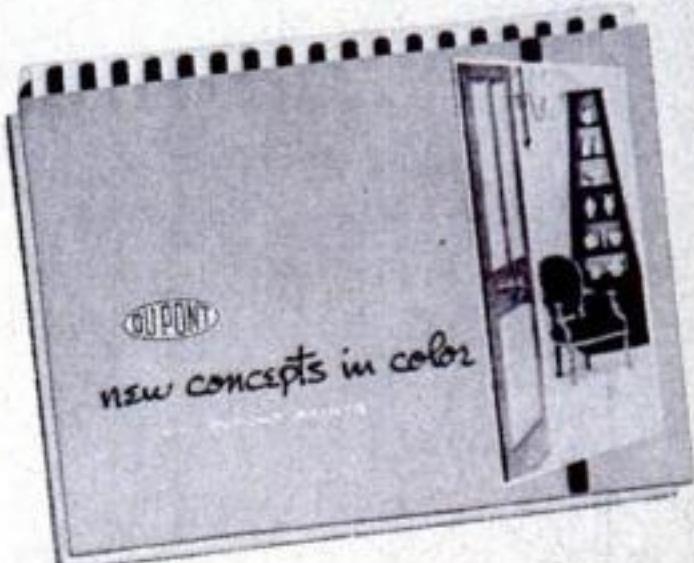
1. *Don't . . . put regular paints on floors. Use paint formulated especially for floor conditions.*
2. *Don't . . . choose a self-cleaning house paint for use on wood above brick or masonry. Use DuPont No. 42 CHALK-RESISTANT HOUSE PAINT.*
3. *Don't . . . apply regular paint to galvanized metal without first using a special galvanized metal primer.*
4. *Don't . . . forget to buy the materials to prepare the surface properly for painting (paint remover, scrapers, wire brush, sandpaper, etc.).*
5. *Do . . . measure up the job before you start, to make sure you have enough paint for ideal appearance.*
6. *Do . . . use the right size and quality brush for the job. Your dealer can recommend the best brush for your purpose.*
7. *Do . . . ask for a primer or undercoater for unpainted surfaces. You'll save time and money.*
8. *Do . . . order gloss or semi-gloss enamel for all interior woodwork and walls of kitchens or bathrooms.*
9. *Do . . . get "Dulux" odorless thinner for use with DuPont odorless interior finishes.*
10. *Do . . . buy the paint that's worth the work! Rely on your DuPont Paint Dealer for expert painting advice. He's in the Yellow Pages.*

Another Du Pont Decorating Service!

Ask to borrow the

Du Pont Color Selector

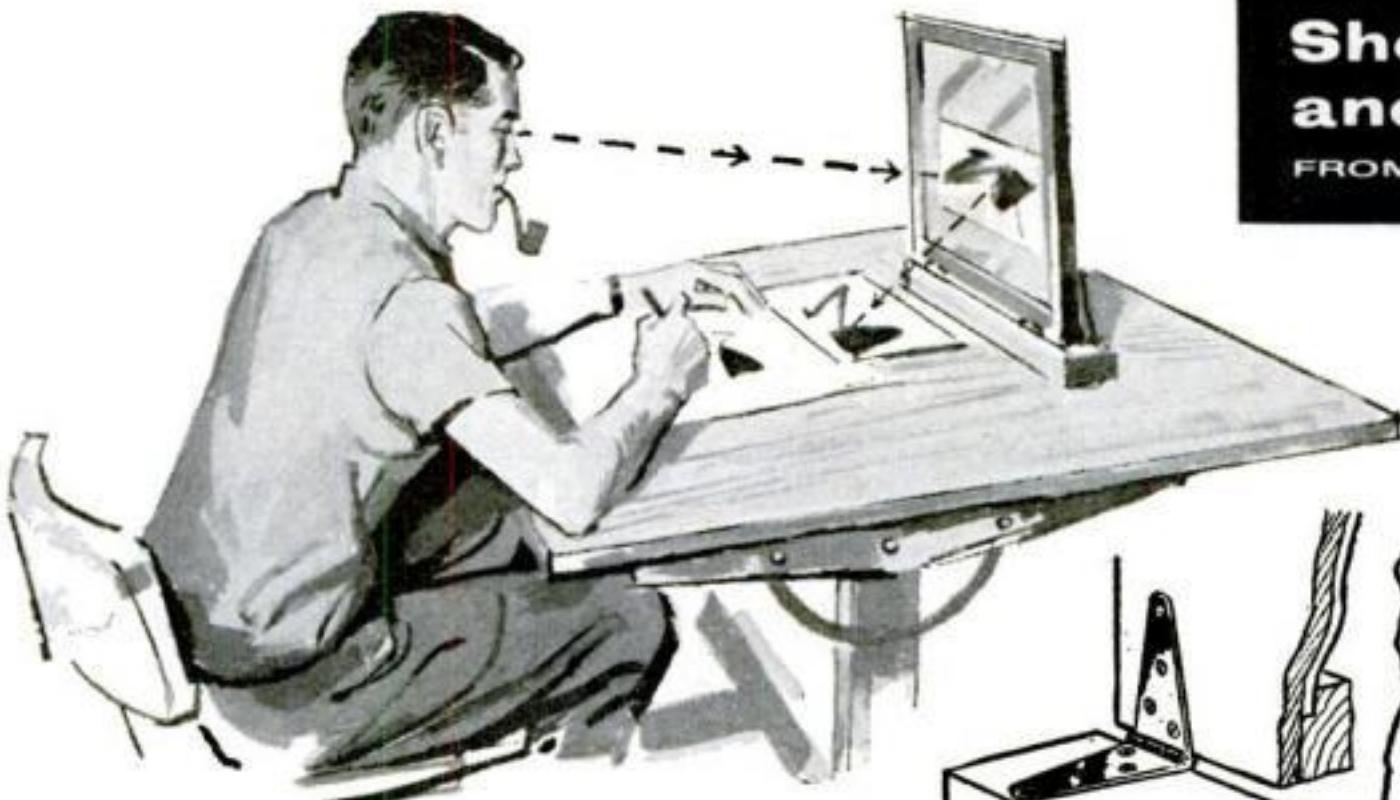
This is the book arranged by (and for) color experts! Shows you what colors harmonize... gives a myriad of color schemes. Takes all the worry away from color planning inside your home... makes decorating simple, inexpensive... fun for the whole family. It's part of the DU PONT PAINT DECORATING SERVICE. Your Du Pont Paint Dealer is always ready, willing and ABLE to help you with any paint problem. Look for his name in the Yellow Pages of your phone book.



Tear out these pages

...for handy reference!

Just place your left hand on the facing magazine page then firmly grasp these special pages with your right hand and pull them gently away. Then keep them near your work bench for ready reference whenever you need to buy paint.

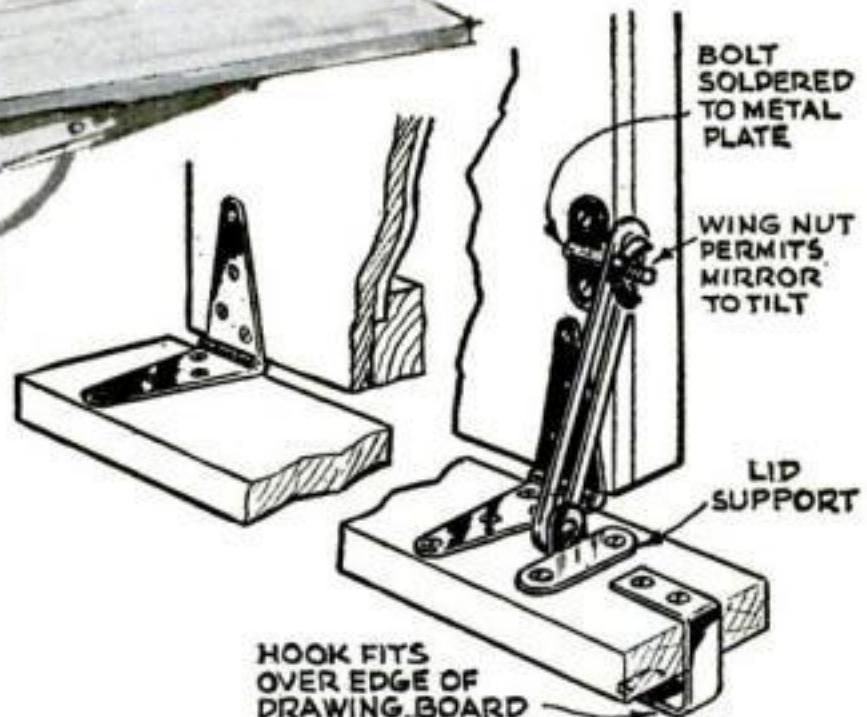


**Short Cuts
and Tips**
FROM PS READERS

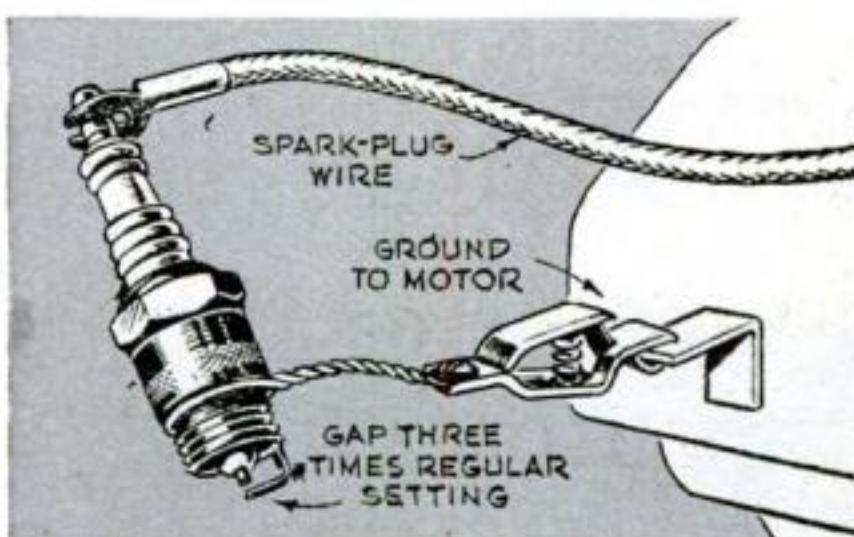
Artist Rig for Reverse Drawing

WITH a tilting mirror hooked onto the drawing board, I can draw reverse pictures more easily than with other methods I've tried.—*Walter L. White, Indianapolis.*

►►►IF SCOURING powder won't remove ink stains on a painted surface, use paint remover—but not enough to eat into the paint. Just dampen a cloth with a little and rub briskly until the stain disappears.
—*Roland Loewen, Baytown, Tex.*



►►►YOU'LL find frequently used tools easy to locate when working on the bench if you paint their handles different colors—for example, screwdriver yellow, hammer red, chisel green and nail set white.—*Stephen Murdock, Clinton, Conn.*



Spark Tester for Small Motors

AN OLD but still good spark plug with the gap spaced three times its normal distance can be used for testing the ignition spark of outboard motors, and lawn-mower and other small gas engines.

To use it, you attach a wire to a clamp and twist it about the base of the plug. Then attach the clamp to the base of the motor or ground, and the ignition wire to the plug terminal. Crank and observe the gap for a spark. It should be fat and blue, and should jump the gap at cranking speed.—*E. W. Harmon, Logansport, Ind.*



Back Window in Television Set

BOOKS for do-it-yourself TV repairs recommend looking inside the set while it is in operation to detect shorts and dead tubes. You'll find this much easier if you cut a square in the cardboard back and tape a sheet of clear plastic over the hole.—*R. Mathiot, Lake Grove, Ore.*

►►►LUMBER that you buy for use at some distant time should have its ends sealed to prevent splitting. You can do this with a thinned coat of shellac. Keep the lumber on a rack off the floor.



Tricks of a Professional Cameraman

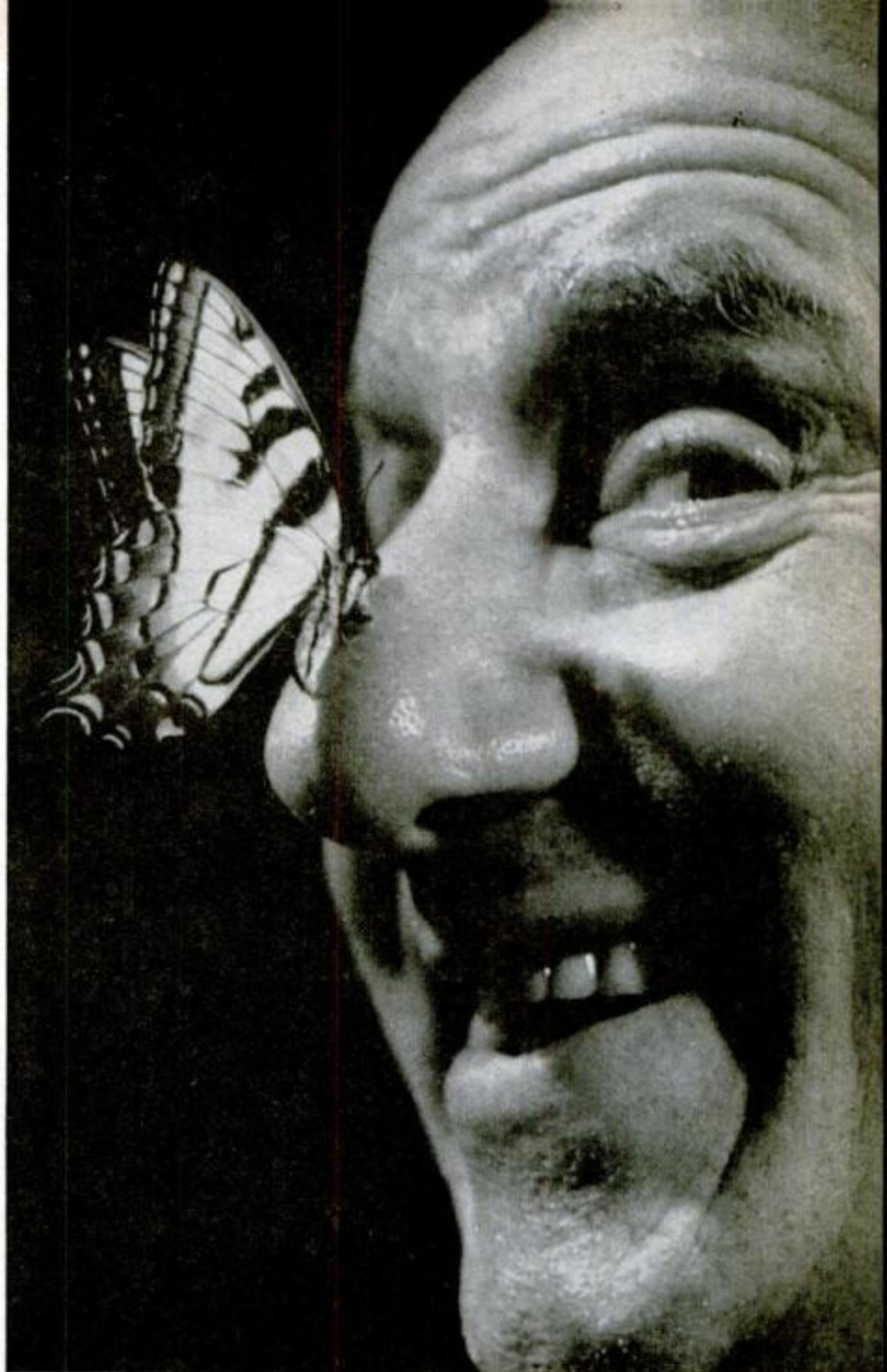
***In each of these photos, at least one element is not what it seems to be.
Can you spot the trickery?***

PHOTOS BY OZZIE SWEET



SHOOTING photographs for sale is a business that's full of tricks. No one knows this better than Ozzie Sweet, a young photographer who has sold more than 1,200 covers to national magazines and who is now expanding into the advertising field. He has revealed some of his photographic and money-making secrets in a new book, *My Camera Pays Off*, published by the American Photographic Book Publishing Co., New York, N. Y. (\$4.95 at camera and book stores).

On these two pages you see some of his more successful photographs, reprinted from the book by permission. All have one thing in common: They didn't just happen by accident. Each one is the product of a great deal of creative imagination and a willingness to work hard.



*For an explanation
of how the photos
were taken, please
turn the page*





How Ozzie Sweet Shot These Pictures

FLYING SAUCERS? To create this scene of one whirling down, photographer suspended a toy flying saucer in front of camera and used a flashbulb inside it.

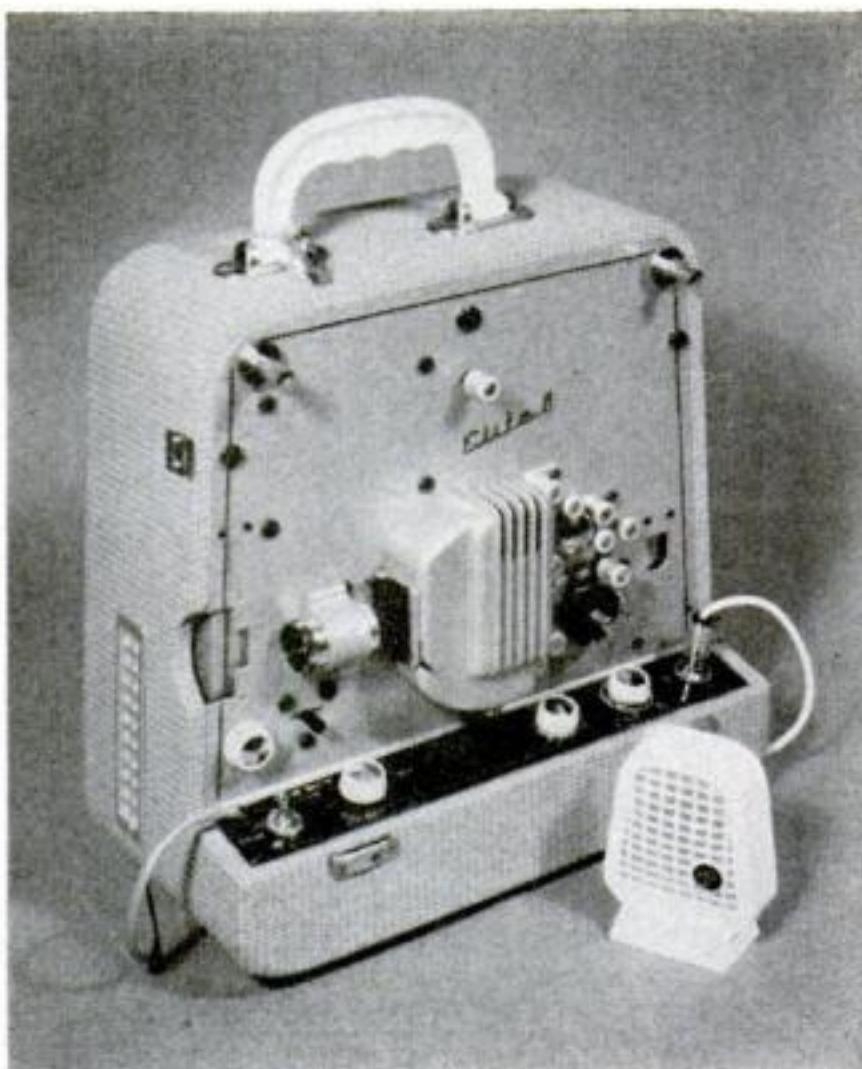
WHO'S MOVING in this scene of apparently violent action? Only the leaping girl at right. Man at left is hanging from support; ball is on string.

THAT BUTTERFLY is a mounted one, of course, borrowed from a museum and taped on as a trick to call extra attention to Jimmy Durante's noted nose.

OUT OF THE WAY! It looks here as if the cameraman was whammed in the kisser. Actually, the ball was on a cord, camera clicked as model blasted sand.

GOOD ACTING by the models is essential in a photo such as this. Did the hunters get the bear, or the bear the hunters? Neither. The bear was stuffed.

WHO-O-O? Natural humor in this carefully staged shot hinged on use of a stuffed owl wired in tree above campers. Flash was used for illumination.



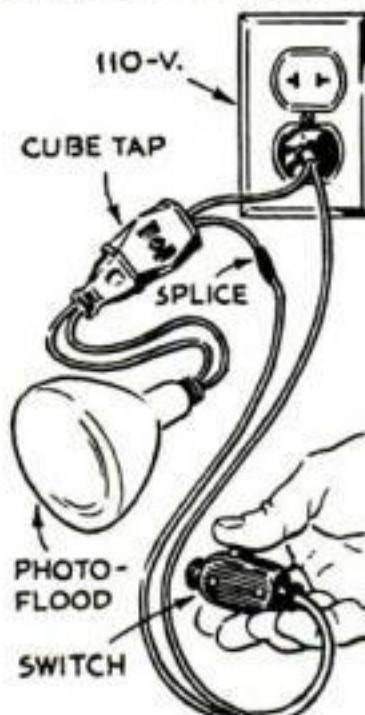
8-mm. Projector Adds Sound

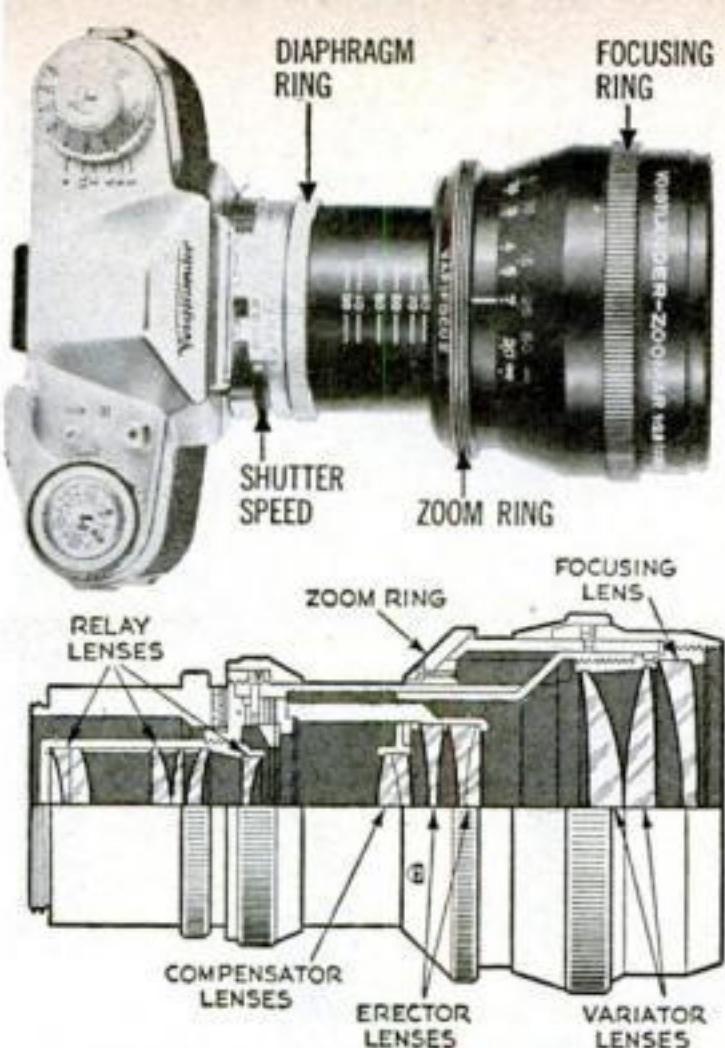
AMATEUR movie makers can have sound on their 8-mm. film with the Elite 8 projector. It runs at 16 or 24 frames per second, has a 750-watt lamp and a built-in tape recorder. Narration and music are recorded on a magnetic stripe added (at three cents a foot) to regular movie film after development.

You record or re-record through a microphone while the film is being projected. Playback is through the projector's own amplifier and speaker. There are connections for an external amplifier and a three-channel mixer. The 17-lb. Norwegian projector is sold here by Tandberg of America, NYC, for \$398.

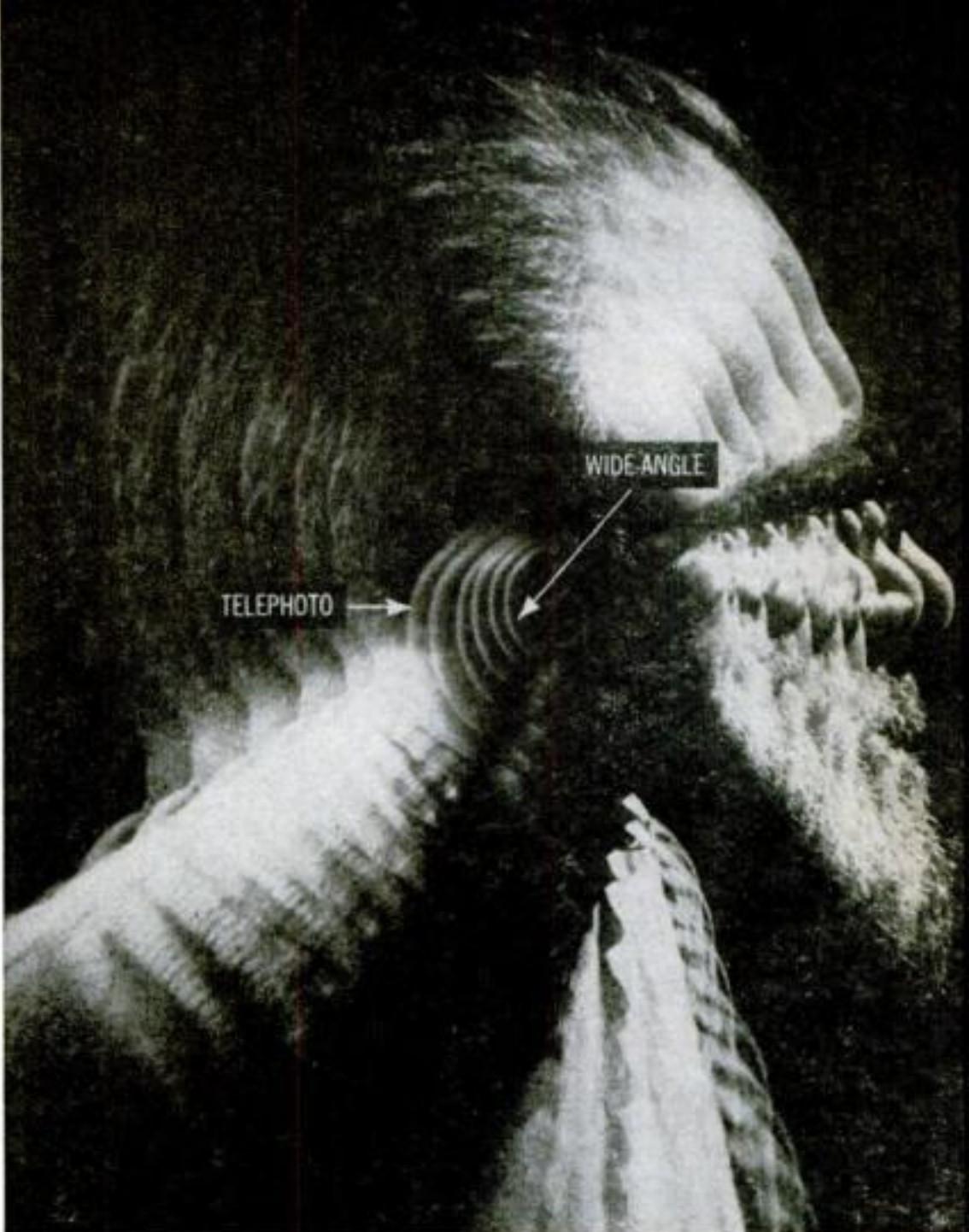
Remote Switch Controls Lights

WITH a switch on the end of a lamp cord you can turn distant photographic lights on and off at the camera. A line plug, cube tap and switch are connected in series. The line plug goes in an outlet, and the light, or appliance, is connected to the cube tap.—*Herbert Y. Moon, Orient, N.Y.*





SIX EXPOSURES with a zoom lens produced the trick shot at right. They were made on one negative with the camera five feet from the subject; focal length was varied from wide-angle to telephoto. The Zoomar (above) has 14 individual lenses. They're mounted in three barrels: An inner and an outer one are fixed, an intermediate barrel is moved to change focal length.



Zoom Lens for 35-mm. Camera Shoots Still Photos

WITH only one lens—a new Zoomar—you can take normal, wide-angle and telephoto pictures. It's fitted to the Voigtlander Bessamatic, a 35-mm. single-lens reflex camera. Though similar to zoom lenses used on movie and TV cameras, it is designed to focus more sharply throughout its range.

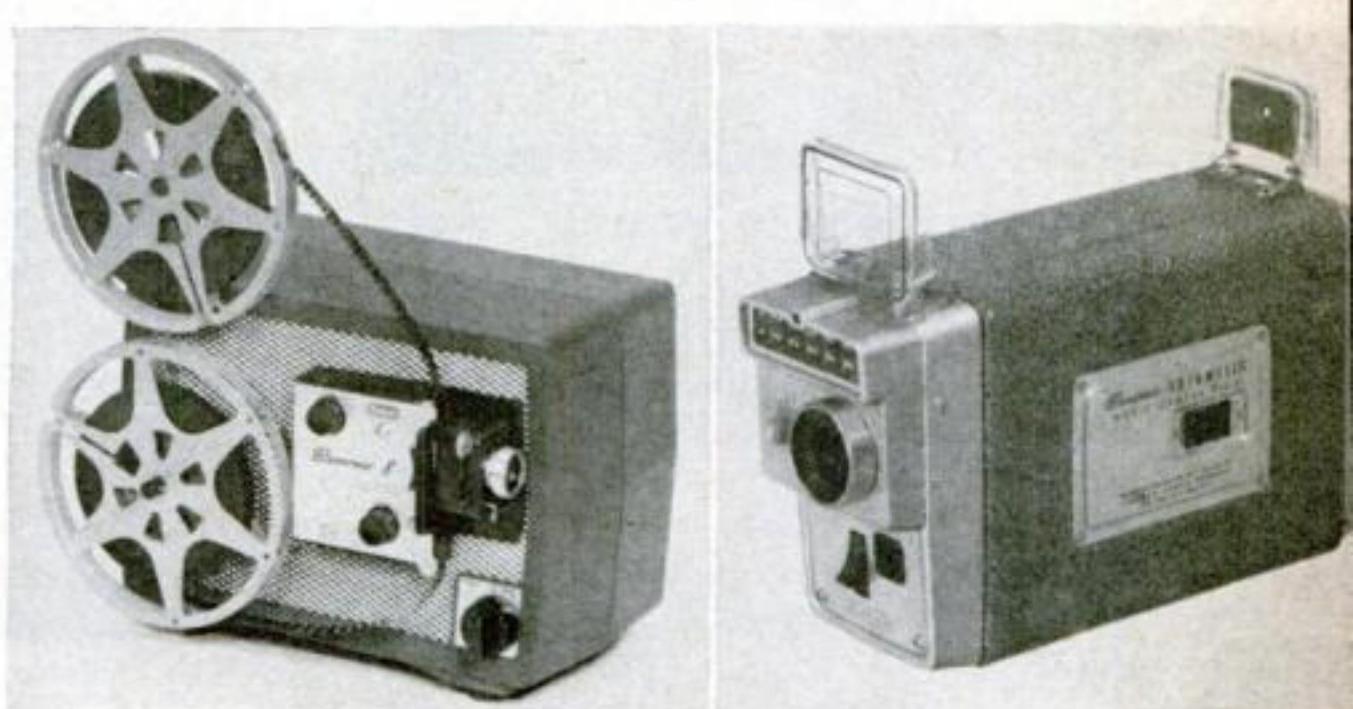
The image size on the ground-glass viewer (and on the film) is changed by

sliding a movable collar along the lens mount. This varies focal length continuously from 36 mm. (wide-angle) to 82 mm. (medium telephoto). Focus and exposure, set independently, do not change as you vary the focal length.

Besides reducing the number of lenses required, the Voigtlander-Zoomar simplifies "cropping" photos in the camera—especially useful for color-slide makers.

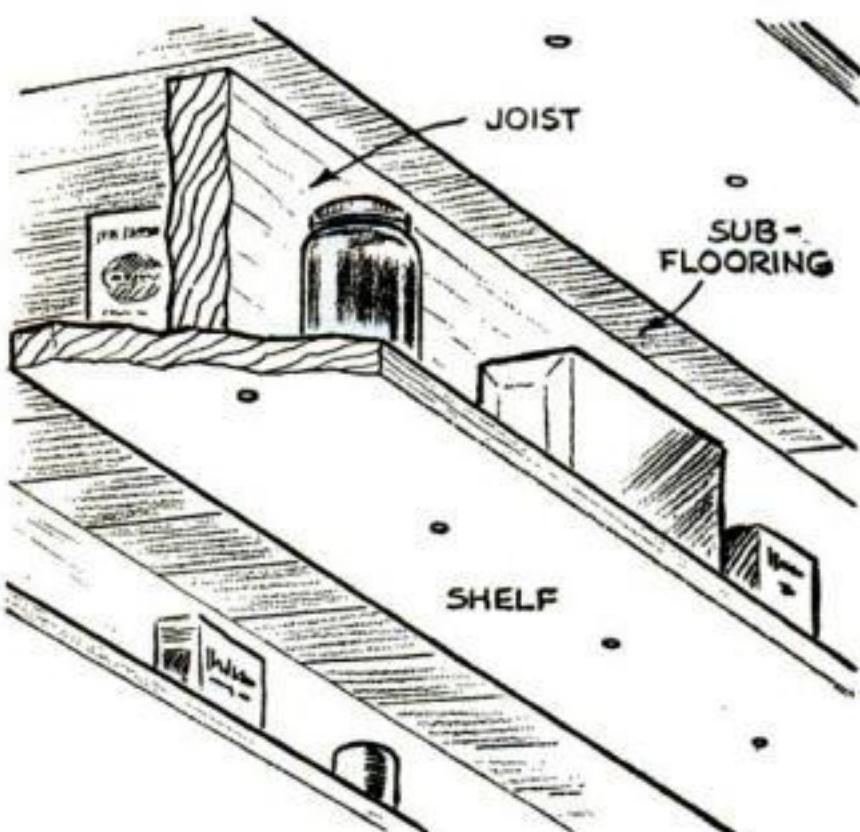
Budget-Priced Outfit Makes Home Movies Easy

A NEW pair of Brownies offered by Kodak brings 8-mm. movies within reach of even a casual amateur. The automatic movie camera, whose exposure meter automatically sets the f/2.3 lens to the correct opening, costs about \$70. A matching Brownie 8 projector is about \$45. Threading film through it is simplified because it has no sprockets.



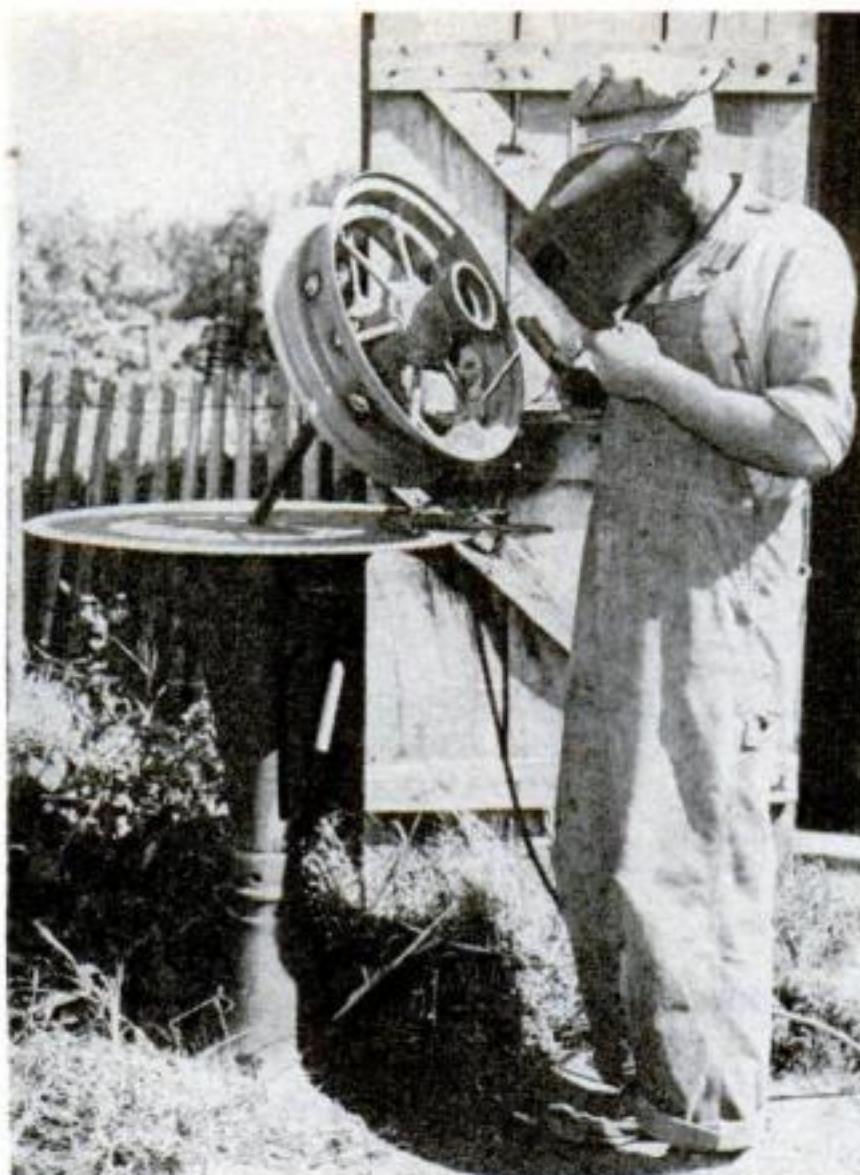
Short Cuts and Tips

FROM PS READERS



Extra Shelves in Basement

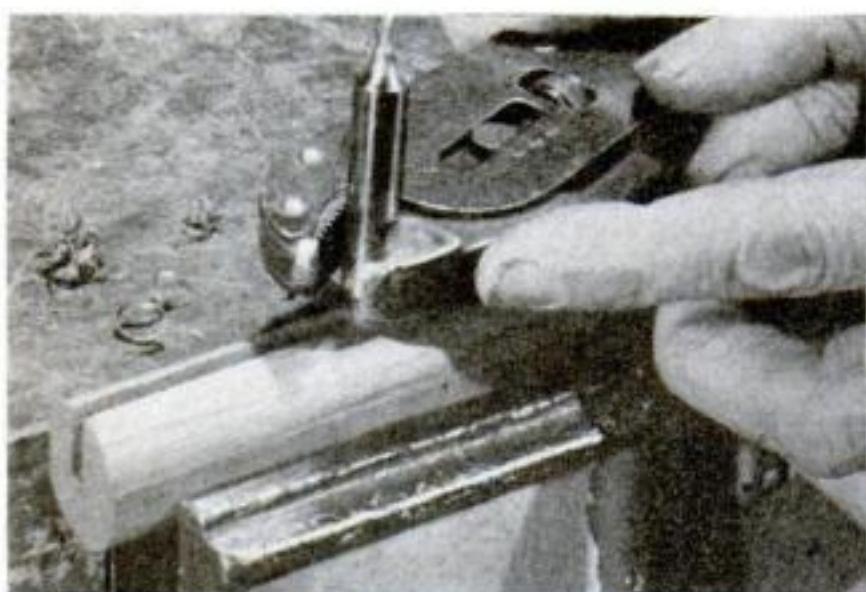
ONE of the quickest ways to get more shelf space in your basement workshop for parts jars and other small items is to nail or screw boards to the joists. Use 6" or 8" boards and attach them along the centers so you will have shelves on each side.—*Rudolph Tomek, Tappan, N.Y.*



Welding Table for Outdoor Use

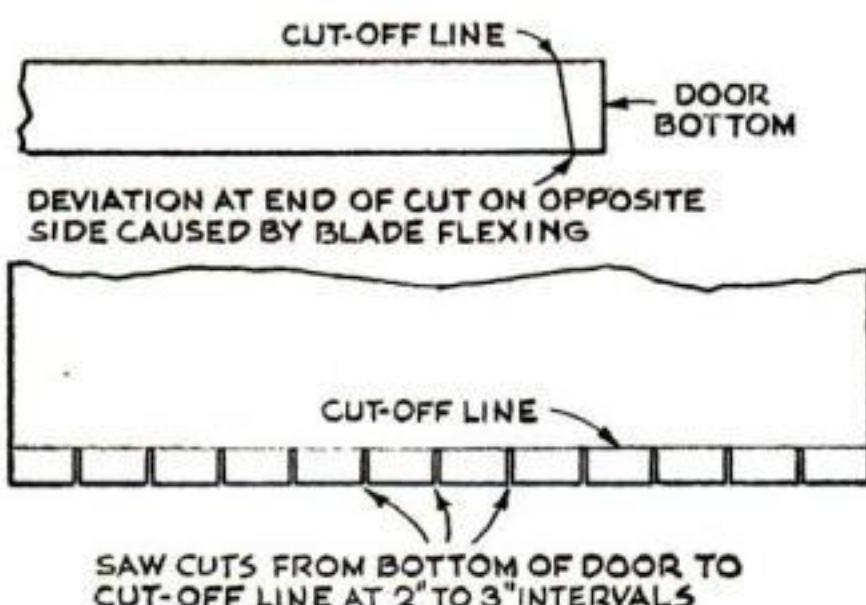
TWO cream-separator bases welded top to top form the stand for this convenient welding table. A large steel disk was welded in place for the table top.

A hole in the center is handy to take a bent shaft on which to rest objects when welding.—*Ralph Pisarik, Lone Tree, Iowa.*



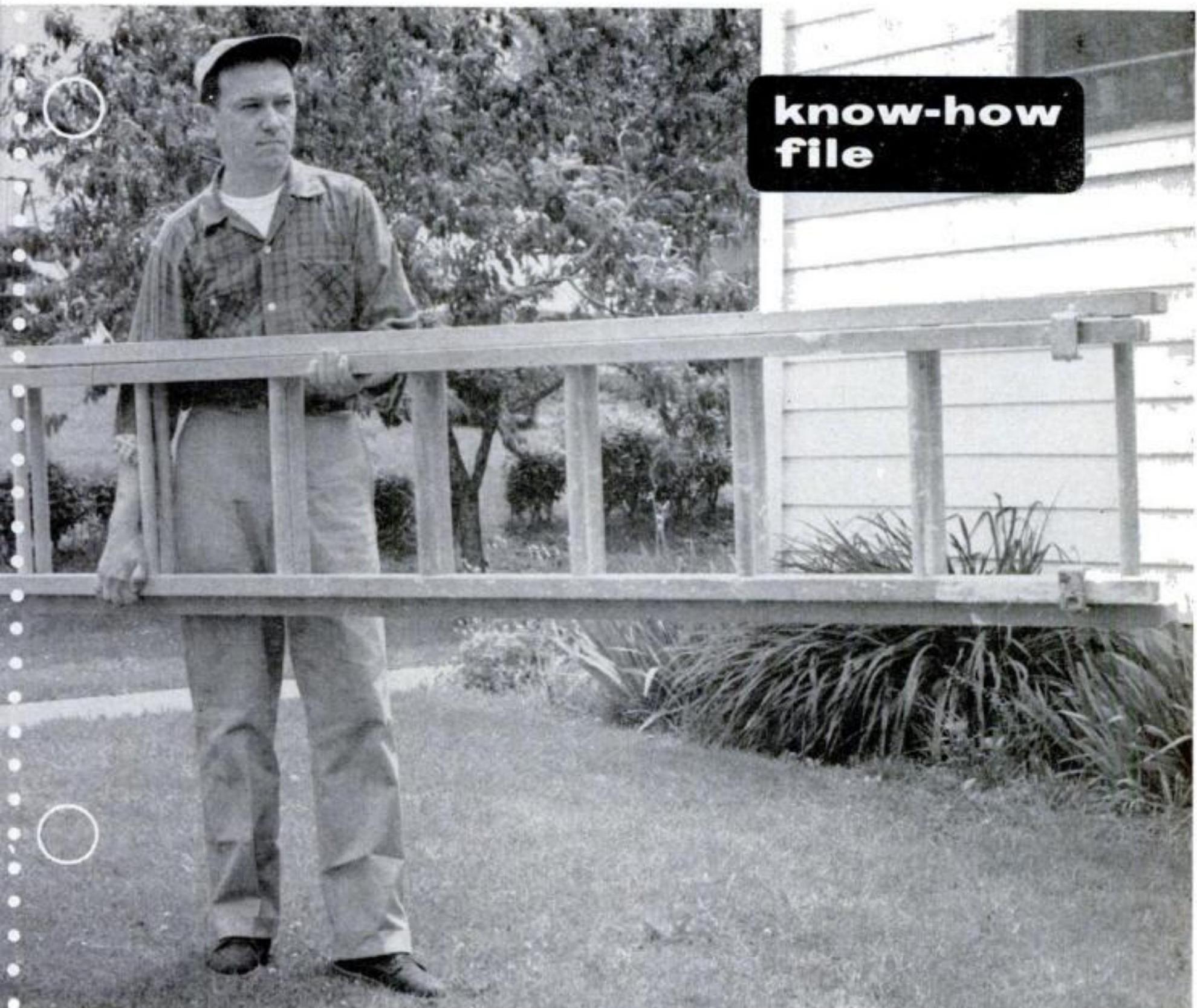
Widening Slots in Wood

WHEN a saw or dado slot in wood is not quite wide enough to receive the edge of a panel, you can widen it by pulling an end-mill cutter sideways through it. Select a cutter slightly smaller than the slot, grip it with clamp-type pliers and pull it through several times, exerting pressure at the side so it will shave the wood.—*Walter E. Burton, Akron, Ohio.*



Tip on Cutting Thick Material

ALTHOUGH a saber saw will follow a line easily, it often veers to an angle that breaks the blade when cutting thick wood such as a door to be shortened. A series of right-angle cuts 2" to 3" apart along the edge in waste wood will help avoid this. As you knock out each block, the blade starts anew with nothing to deflect it.—*G. A. Propst, Waco, Tex.*



**know-how
file**

The safest and easiest way to carry a ladder to the job: Hold it at its point of balance.

The all-important do's and don'ts of—

Working With a Ladder

LADDER work can be easy and safe when you follow common-sense rules. Whether you are working with the time-honored wood ladder, or an aluminum, magnesium or other new kind, the same handling rules apply in general. But be extra careful around power wires with a metal ladder; it's an excellent conductor.

It's a good idea to use rubber feet on

the base of a lightweight ladder. Unshod, it's likely to slip while you are on it.

Keep your ladder rigid and safe by inspecting it yearly, going over rung rods or step bolts with a wrench. Never paint a wood ladder. Clear sealer or varnish are okay, but paint can hide cracks.

You'll save space and won't trip over the ladder if you hang it about waist high on your garage or shop wall.

Please turn the page for more ladder tips

MAY 1959 189



TO RAISE A LADDER, lay it down with the base against a step or foundation so it won't slide. Kneel, grasp the top rung and lift the top of the ladder head high. Then step under it.



WALK THE LADDER UP to a vertical position by placing your hands on alternate rungs as you walk forward under it. Grasp the rungs near the outer ends to keep ladder from twisting.



EXTEND UNROPED EXTENSIONS by lifting top away from building, pulling up on bottom extension rung. If extension top has rounded ends, push up top section as you climb on lower one.



POSITION BASE so space between it and building is one-fourth length of ladder. Be sure uprights rest evenly. On uneven ground, shim base as shown. On smooth surface, tie base to building.



CARRY THE LADDER vertically to position against building this way. Set base on ground and lean forward. A foot placed against base will help balance. Reverse the procedure for lowering.



PRACTICE CLIMBING STANCE: Grasp ladder firmly and place feet squarely as shown. Either going up or coming down, look straight ahead. Shoes with heels and thick rubber soles are safest.

For Safety, DON'T...

... use a ladder as a platform.

... try to handle an extremely long ladder without help.

... climb when shoes—or rungs—are covered with mud, snow or grease.

... allow more than one person to climb or work on a ladder at the same time.

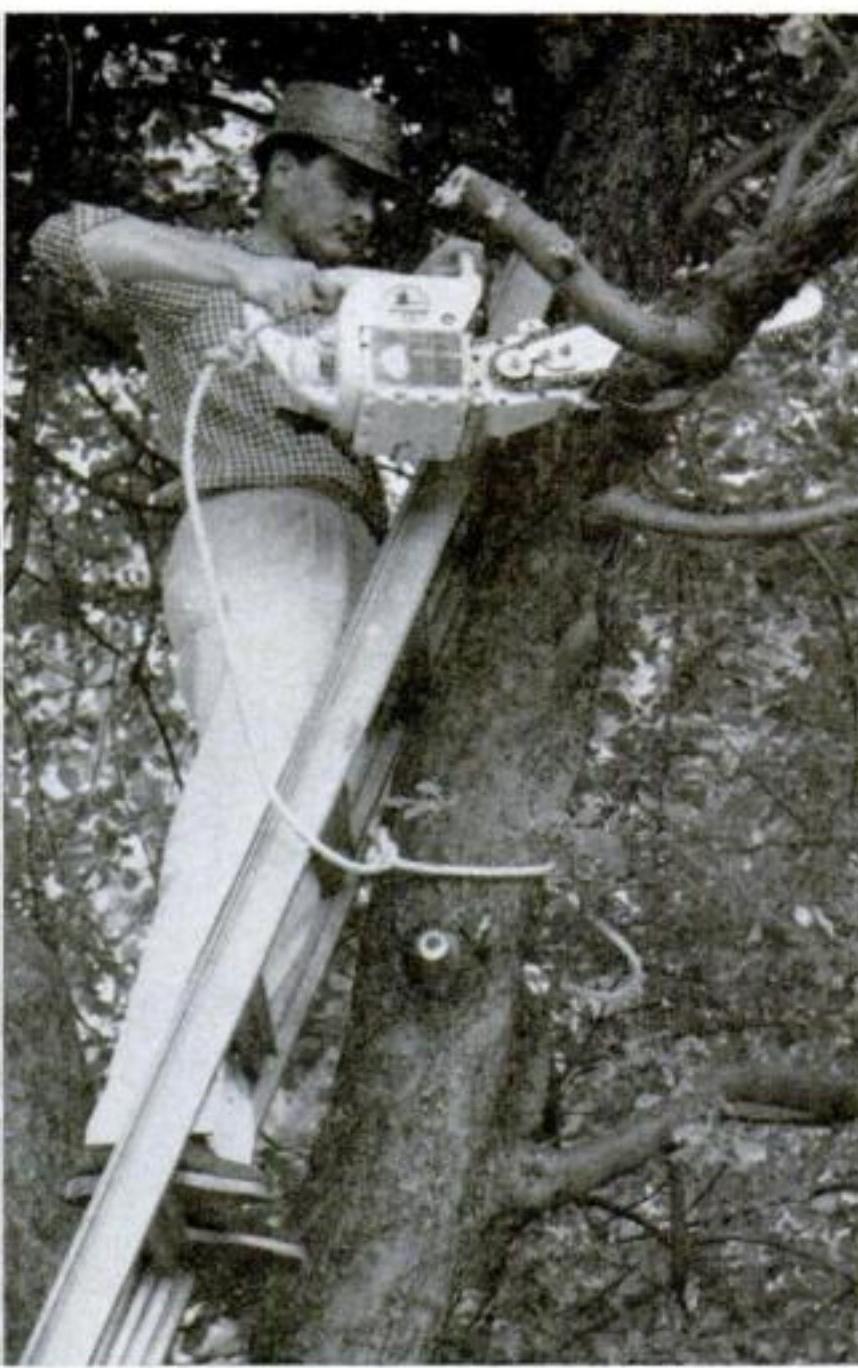
... buy a ladder on price alone. Be sure it is rugged enough for the job.



IF YOU MUST WORK WITH BOTH HANDS, get best balance with widespread feet, legs against rungs. Hook legs over rung if necessary. Never work on top three rungs. [Please turn the page.]



RAISE LARGE OBJECTS with a rope. Extend ladder two feet above roof edge to allow stepping off onto roof. Tie ladder to eaves if wind is strong or there are children playing nearby.



TETHER TOOLS to avoid damage from accidental dropping. For tree work be sure ladder is supported squarely by a firm limb. When trimming and pruning limbs, work close to the ladder.



FOR ROOF WORK you can buy metal ladder brackets to hook over ridge. Or you can have a blacksmith make a pair from strap iron. You can also fashion brackets from scrap pieces of

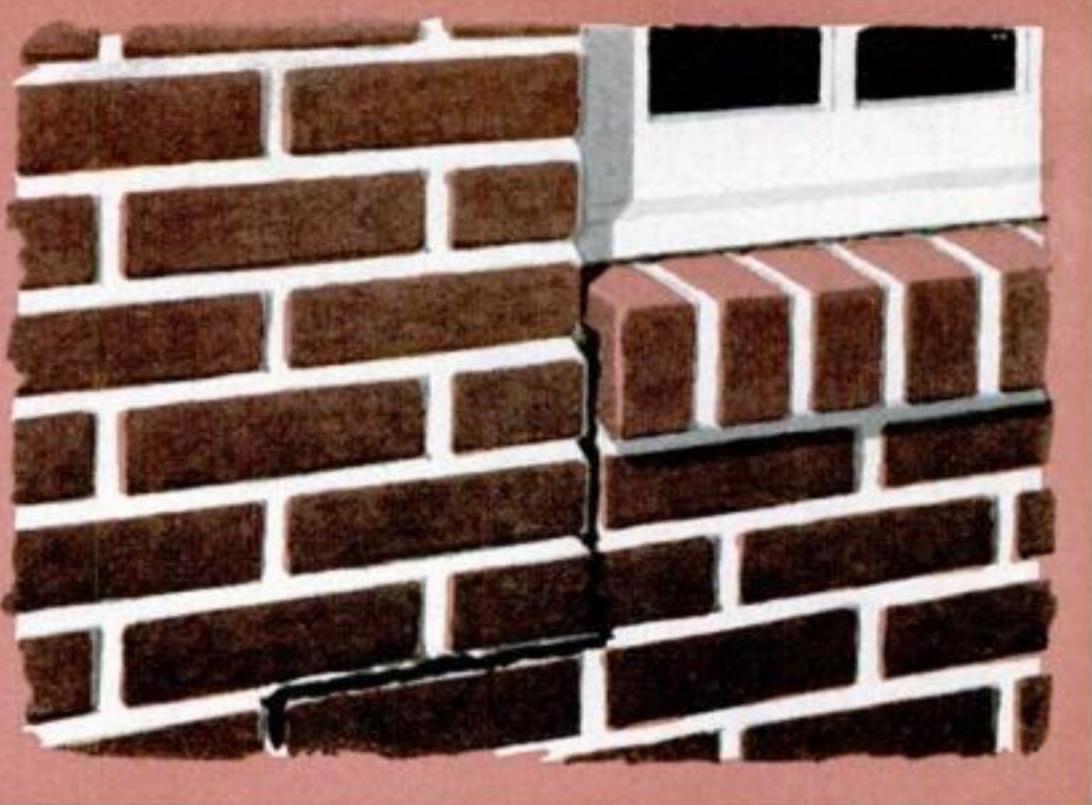


wood about 3" wide and nail or screw them in place. When roof is especially steep, tie rope to ladder and other end to a crosspiece inside a window on the opposite side of the house.

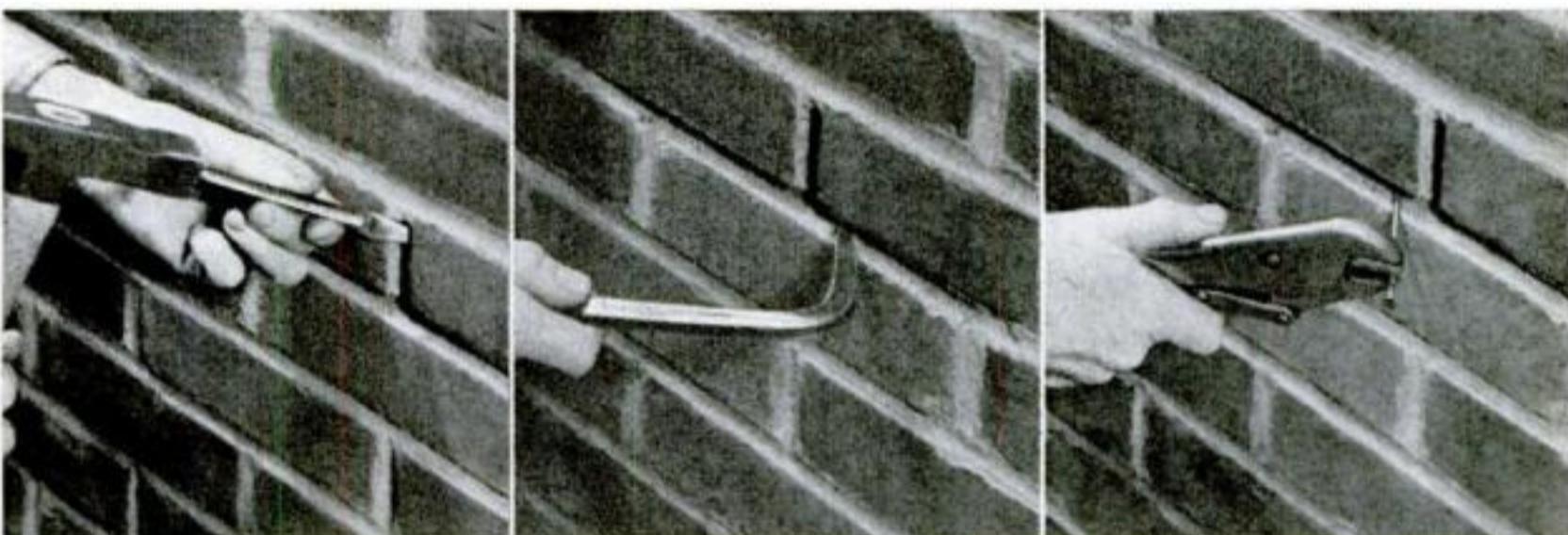
Repointing Masonry

fix-it file

CRACKS IN MASONRY develop in many ways: uneven settling of the foundation, rapid temperature changes, moisture in the mortar freezing and expanding against joints. Cracks commonly start at window and door openings. The resulting leaks and poor appearance can be easily corrected by renewing the mortar where cracks occur.



How to prepare the joints

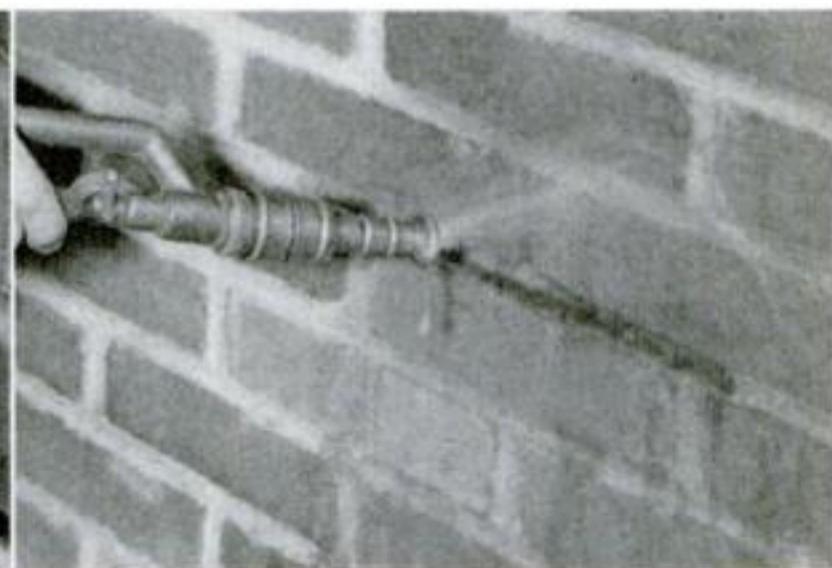


DIG OUT CRUMBLY OR LOOSE MORTAR from the joints, using a cold chisel (left), a hooked mortar rake (center), or even a heavy nail gripped in cam-locking pliers. Clean out joints to a depth of an inch or more, breaking out small chunks of mortar at a time to avoid

cracking the brick. Try to undercut the groove slightly to provide a deep, keyed base for the new mortar. An electric drill fitted with an abrasive cutting wheel does a neat grooving job, but be sure to wear goggles to protect your eyes from flying grit.

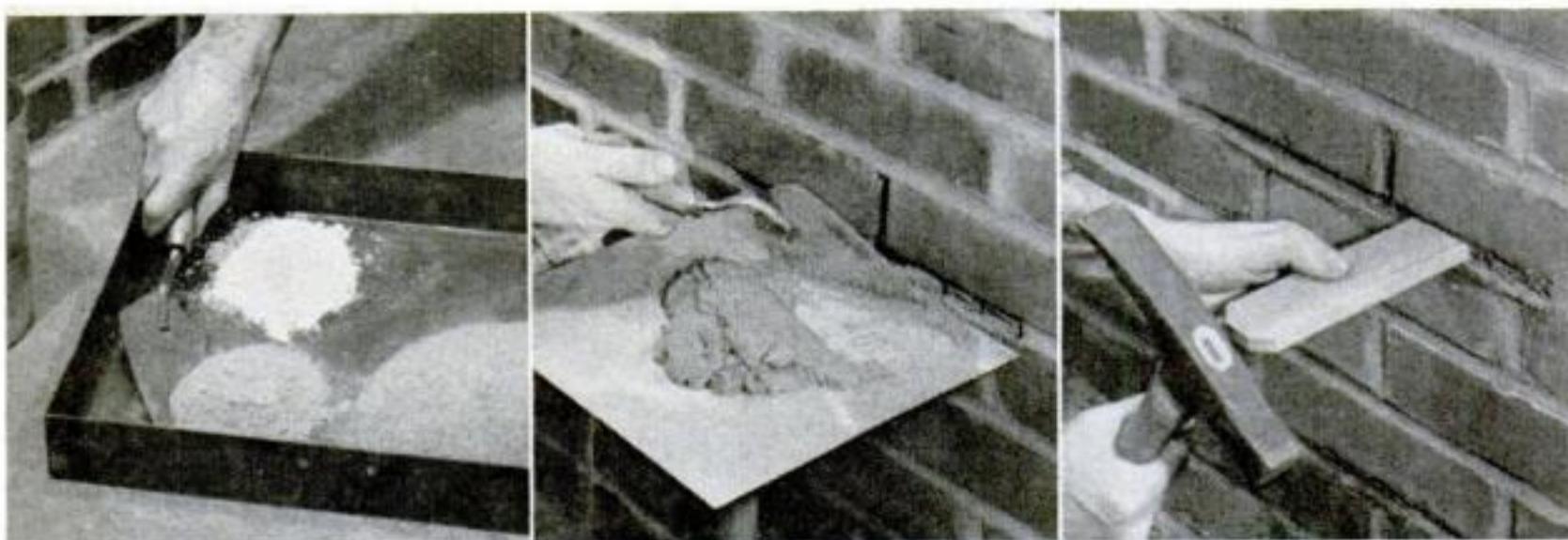


BRUSH OUT MORTAR DUST and check cut of deepened joint. It's best to clear joint to surface of brick, but if mortar is difficult to remove, a thin layer can be left on brick.



THOROUGHLY WET THE JOINT and surrounding area so water won't be drawn from mortar when it's applied. Several wettings 10 minutes apart are better than a single one.

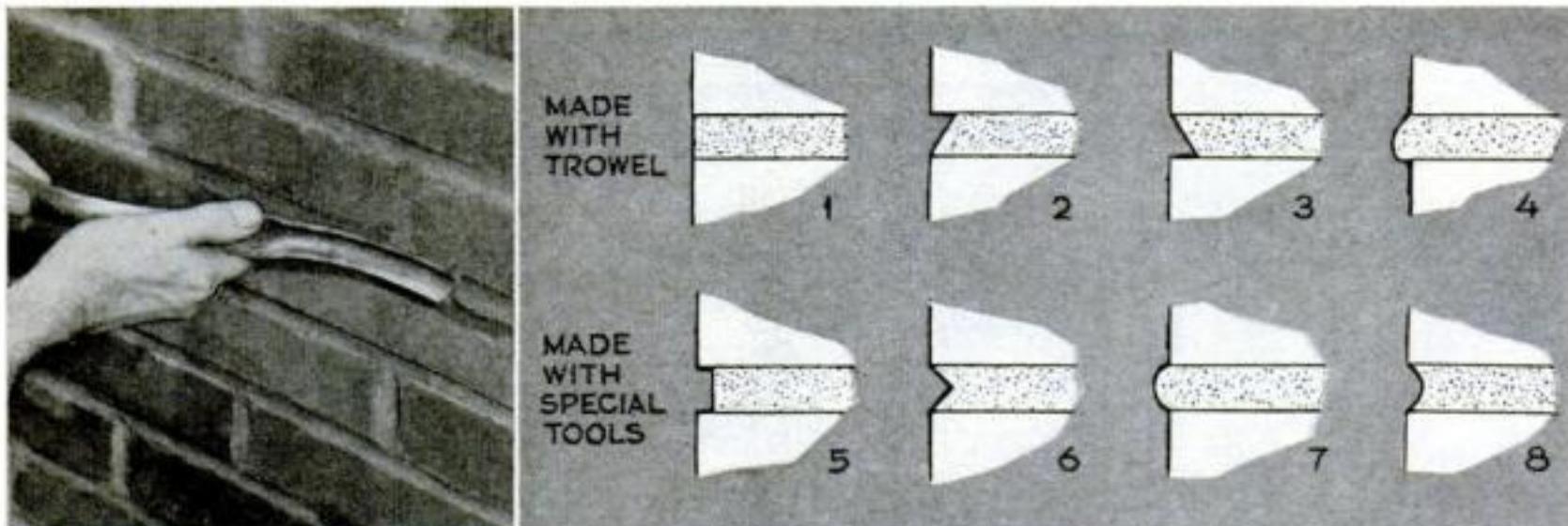
How to fill the prepared joints



A GOOD MORTAR MIX for pointing is one part portland cement, one part slaked lime and six parts clean sand. Mix this thoroughly in a shallow tray and add water to make a firm mush. If you prefer ready-mixed mortar, ask for *pointing* mortar. Slide the mix off

the mortar board and into the joint with a pointed trowel (center) and work it in with the trowel point. For a good watertight joint, tamp the mortar into the groove with a square-ended piece of $\frac{3}{8}$ " wood as shown at far right, then add more to fill joint.

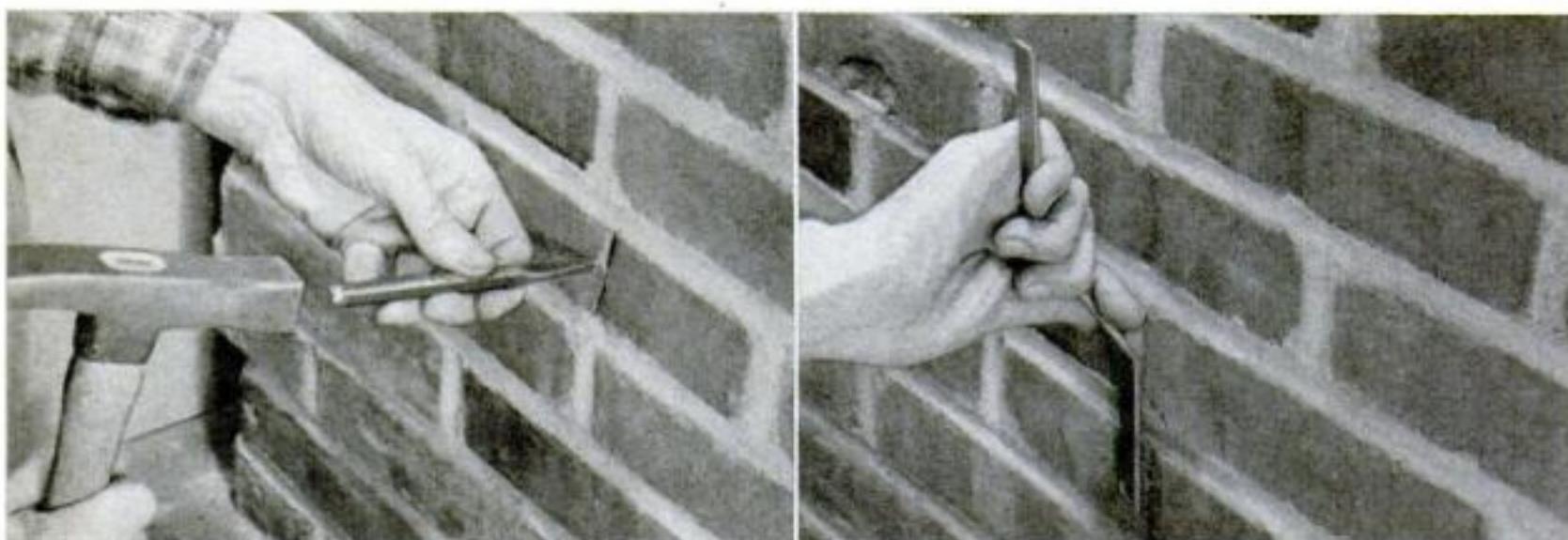
How to finish the filled joints



AFTER FILLING THE JOINT flush with the brick, run the proper striking tool along the fresh mortar to shape and blend it in with the rest of the wall. Joint styles numbered 1 to 4 above (Flush, Weather, Struck-up and Squeezed) can be formed with the trowel.

But you will need special raking or striking tools to form joints 5 to 8 (Raked, Vee, Convex and Concave). When the joints are nearly dry, brush them with a whisk broom or scrubbing brush to give them a weathered appearance that matches the old mortar.

How to repair cracked brick



A CRACKED BRICK may not be noticeable, but it will admit water. Widen the crack to a depth of $\frac{1}{2}$ " to 1" by taking out small chips with a narrow chisel; then fill as above.

THE FILLED CRACK can be struck, as shown, to look like a regular joint, or the mortar can be troweled flush with the brick and then painted red to make an invisible repair.



OWENS-CORNING FIBERGLAS PHOTO

WHAT YOU SHOULD KNOW ABOUT **Insect Screening**

IT'S easier now to beat the bugs. You no longer have to paint or store screening materials periodically unless you prefer, and the nuisance of replacement is largely eliminated.

Besides separating people from flying insects, screening nowadays has many other jobs. For instance:

- It's also designed to give you privacy, while still letting you see out.
- Some types shade your windows, keep your house cooler.
- It is gaining wide popularity as the

cheapest way to enclose new living space.

- It's being put to such unorthodox uses as covers for swimming pools, carryalls for leaves, bags for laundry, grass-catchers for lawn mowers.

Standard for all types is 18-by-14 mesh. This means that vertical wires are $1/18"$ apart, horizontal wires $1/14"$ —the largest opening that will keep out mosquitoes and small flies. In sections where gnats and other very small insects are a problem, 20-by-20 mesh is used.

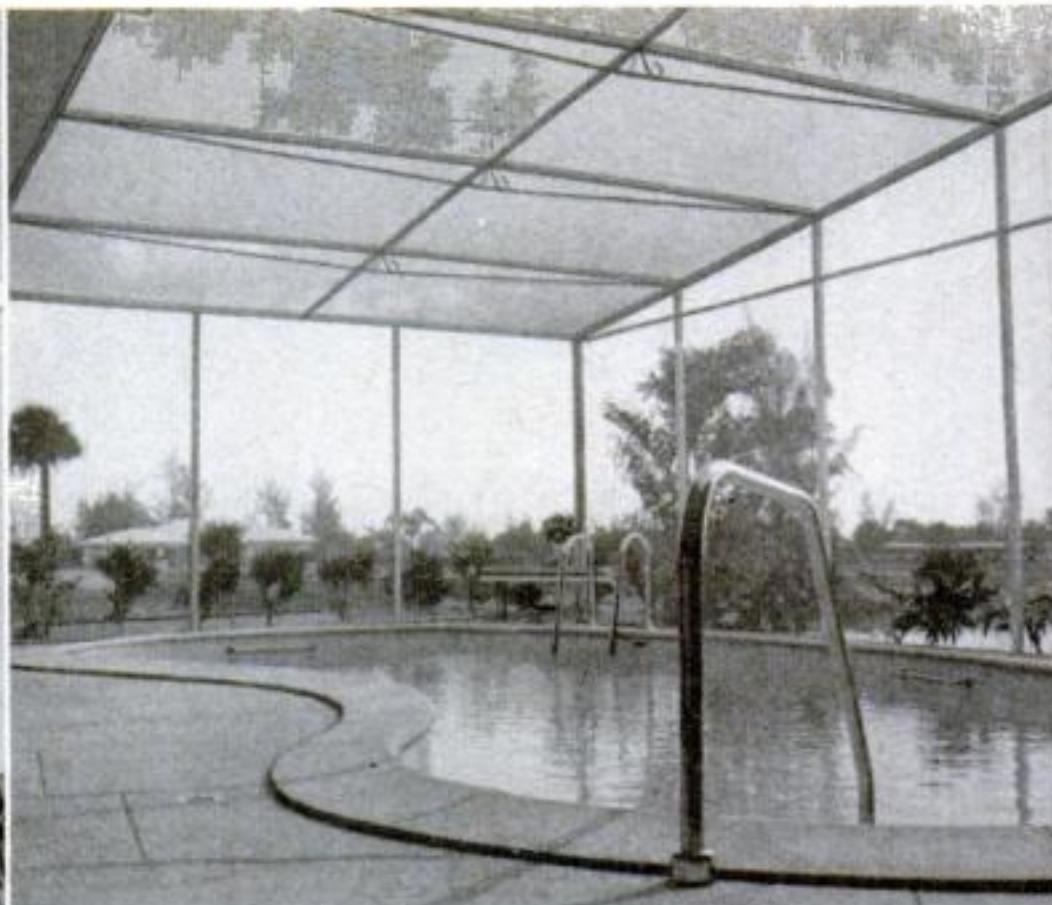
Aluminum screening, introduced only



COMPLETE KITS for screenhouse shelters or patio enclosures, like the one above, are growing fast in popularity. A typical 9'-by-12' size, including bugproof roof, sells for about \$300.

about 10 years ago, has now become the biggest seller. It averages 12 to 13 cents a square foot but you can buy it for as little as 10½ cents. It has the substantial, durable feel of metal that many people favor, but its stiffness can be a handicap; once bent or dented, it's nearly impossible to repair.

With care, and in the right climate, aluminum screening can last a lifetime, but where there's salt in the air it deteriorates quickly. Though it won't rust, it does corrode, and this means its screen

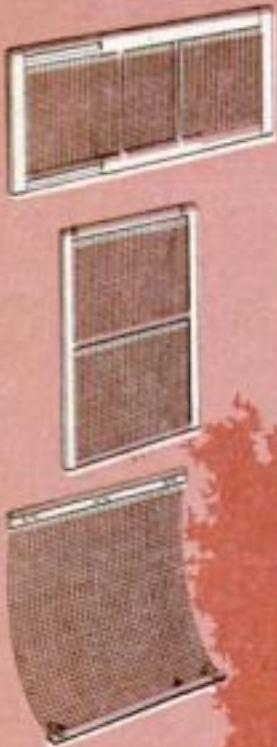


POOL SCREEN blocks not only bugs but leaves, wind-blown trash and unwanted intruders. Because it is easy to see out, hard to see in, screening gives good privacy from distant viewers.

apertures become progressively smaller, cutting out air and view. Best quality aluminum is anodized or coated. It has superior resistance to corrosion.

Vinyl-coated aluminum. A new method of countering corrosion is to coat aluminum with vinyl. Vinyl-aluminum is more resistant to salt, smog, and chemicals in the atmosphere than other metal screening. Its cost is only slightly higher than for standard aluminum. To permit the vinyl coating, however, the diameter of the screen wire has been substantially re-

Five ways you can buy screens



TELESCOPING SCREEN is one of cheapest, can be expanded to fit any stock double-hung window. It must be removed to close window.

RIGID FRAMES are custom-fitted to each window, must be hung on the outside. Metal type may be left up all year, but wood frames are best stored over winter.

TENSION SCREENS have no frames, are stretched taut between top and bottom bars. Low in price, this type can be unhooked quickly for window cleaning or storage.



ROLL SCREENS work like window shades, need never be removed. When unhooked from bottom, they roll up into metal tubes at top of window. You can get them 18" to 52" wide, up to 52" high.

COMBINATION UNITS have sliding screen and storm sash in a single frame that stores one while the other is used. They sell for \$18 to \$25 in aluminum, under \$10 in wood for most sizes.

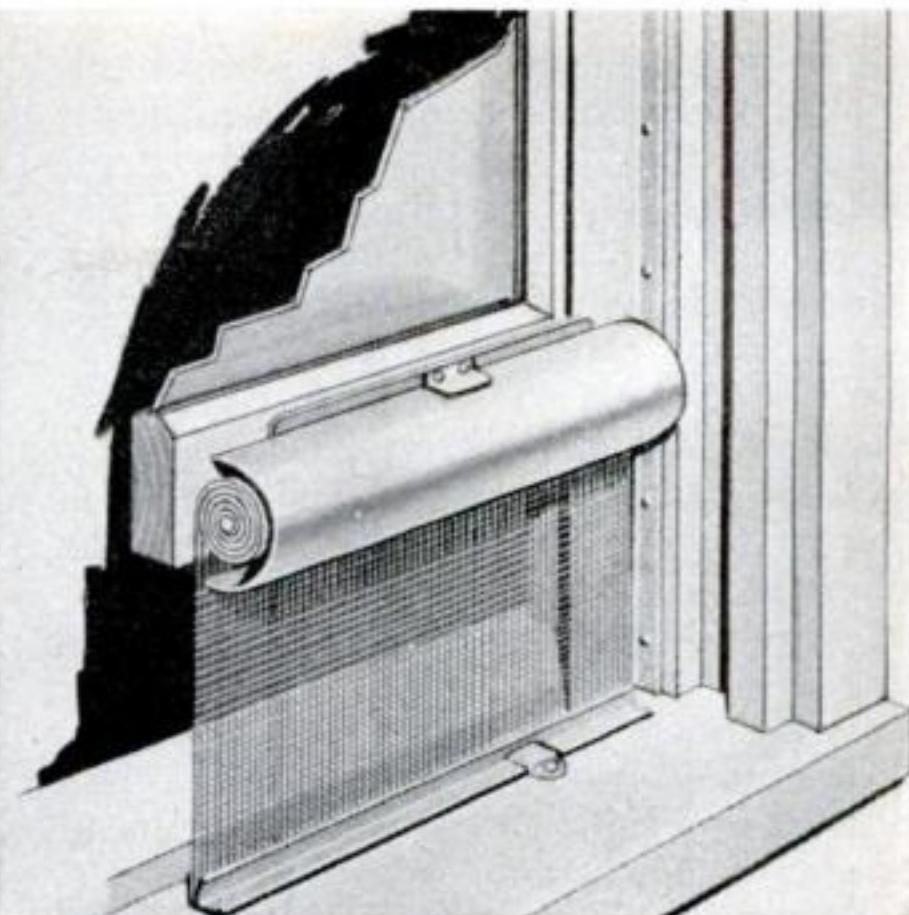


INEXPENSIVE ENCLOSURES can be made by tacking or stapling unframed screening directly to existing structures. Be sure fasteners are of the same metal as the screen to avoid corrosion.

duced, with a corresponding reduction in its strength.

Galvanized screening was the biggest seller until displaced by aluminum. Its best feature is its price—as low as six cents a square foot, though better grades run around 8 to 10 cents.

Galvanized gives especially good service in dry climates where corrosion is no problem. Even so, it should be painted every other year. Painting cuts down on the screen apertures and eventually clogs many of the openings, but the only alter-



NEWEST AUTOMATIC SCREENS attach to bottom of sash and unroll only as window is raised so they don't obscure view or light when window is closed. Cost is about \$6 for average size.

native is rust. Better-quality galvanized may come with a baked-on varnish coat.

Basic quality requirements for galvanized and aluminum screening are covered by U. S. Department of Commerce standards CS 138-55 and in U. S. Government Specifications RR-S-141A. Buying screening that the manufacturer labels as conforming to these standards is your assurance of acceptable quality.

For those who live in rented houses, or where screening arrangements are otherwise temporary, galvanized screen-

How Screening Materials Compare

Type	Price per sq. ft. (in cents)	Attracts dust	Comes in colors	Corroded by salt air, smog	Dents or creases	Requires varnish or paint	Shrinks or stretches	Stains house paint
Aluminum	12-13	no	no	yes	yes	no	no	no
Copper and Bronze	17-20	no	no	yes	yes	recommended	no	yes
Galvanized	6-10	no	no	yes	yes	yes	no	no
Glass Fiber	13-14	yes	yes	no	no	no	no	no
Plastic	6-10	yes	yes	no	no	no	yes	no
Vinyl-Coated Aluminum	14-15	no	no	no	yes	no	no	no

Screening is usually available in these widths: 24", 26", 28", 30", 32", 34", 36", 42", 48" and sometimes 60" and 72".

ing is undoubtedly one of the best buys.

Glass-fiber screening is even newer than aluminum, but has already made big inroads, and is gaining rapidly. Chief reason for the resistance to glass fiber, apparently, is a mistaken belief that stiffness means strength. Glass fiber is as flexible as cloth and feels flimsy, but actually no stronger screening is made.

Each strand consists of 408 glass filaments, woven together like cable, each filament covered with two coats of baked-on vinyl. The result is screening that is not affected by salt air or industrial fumes.

Because it won't dent or crease, glass fiber is especially easy to handle. It can be stapled, or fastened with a vinyl or acetate-base adhesive, such as Duco Household Cement. Its light weight (four pounds per 100 sq. ft.) makes it a superior screening for places where a large area must be spanned without sags or bulges. Sections of the fabric can be stitched together with Dacron sewing thread.

Glass-fiber screening is available in gray, green and bronze, the darker colors giving the best visibility. A new spray-type vinyl-base paint (Sherwin-Williams) has recently been developed for glass fiber, widening its color range to include earthy greens, tans and reds. The paint won't stick to aluminum filament, but it will to aluminum frames after treatment with a washer coat of Solvent White.

Glass-fiber screening has a tendency to pick up dirt and dust from the air by electrostatic action. Cleaning is readily done with a damp sponge or a hose.

Plastic screening, developed as a replacement for hard-to-get metal during World War II, is now produced almost exclusively for export, but some is still available domestically.

It's a tough material, but it has little dimensional stability. Heat shrinks it, and in direct sun the screening may warp its frame out of shape. This is less likely to happen, however, in a wood frame or

a heavy aluminum one. Trouble is almost certain with lightweight aluminum frames. Plastic burns. A lighted cigarette will melt its way right through.

Copper and bronze screening at 17 to 20 cents a square foot is pricing itself out of the market, although it made a name for itself back when it was the only non-rusting screening.

Copper oxidizes and stains paints. Such stains on white walls are very noticeable and won't wash off. The only way to get rid of them is to repaint. Applying spar varnish periodically to copper screening will help prevent staining.

Copper and bronze have a degenerative chemical reaction with aluminum. If alu-

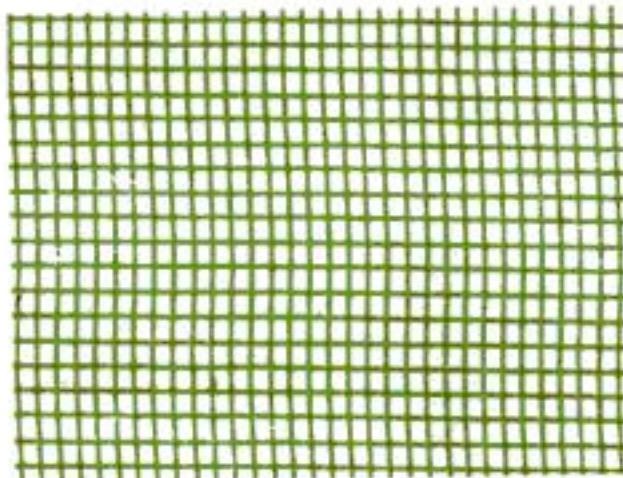
minum is used in a frame that previously was used for copper, it's advisable to scrub it clean or copper salts may cause the aluminum to "rot out."

Shade screens not only bar insects but keep out the sun as well. This means cooler interiors, lowered air-conditioning costs, and a reduction in sun-fading. Where you have both sun and bugs, the extra cost is well worth it.

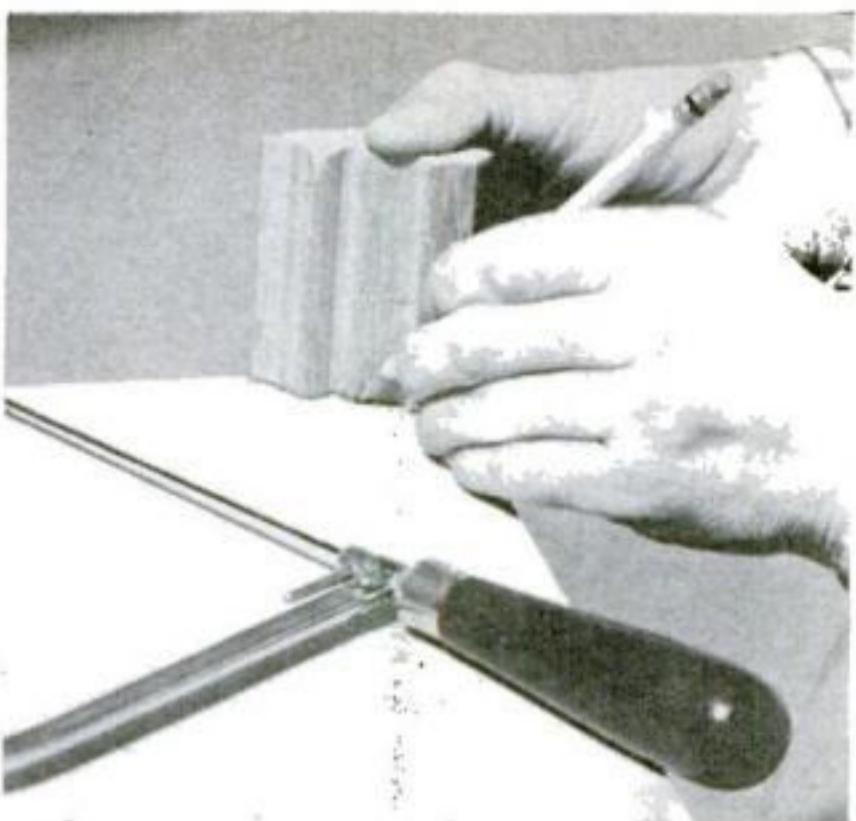
In typical shade-screen manufacture, a thin sheet of aluminum is stamped out to form 17½ louvers to the inch. These have a 17-degree downward angle, best for stopping the sun no matter what its position in the sky, so there is never any need for adjustment. The screens are highly effective for privacy. Placement of the louvers permits seeing out (83 percent estimated visibility) but prevents those on the outside from looking in.

Another shade-screen type is made of woven bronze cloth, but its price is high—79 cents per square foot.

Other screening includes enameled black wire, at about four cents a square foot. It has a lower life expectancy than galvanized. Stainless-steel screening is the ultimate in quality and durability, but its price is so high it has limited use. Nylon screening sells at about eight cents a square foot. It is used where light weight and complete flexibility are wanted.



YOU CAN EVEN HAVE COLORS in modern screening. Glass-fiber mesh is available in gray, green and bronze, and special spray-on paints make possible tan, red and other tints. Darker colors give the best visibility through screens.

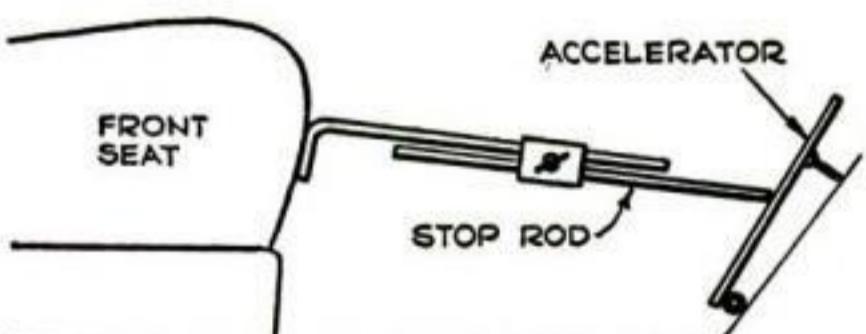


Fitting Built-Ins to Molding

THE easiest way to cut shelves and other built-in pieces to fit around ceiling or floor molding is to use a scrap of the molding as a pattern. Trace the outline and make the fit with a coping saw.

Except in the oldest houses, all trim is standard. If you don't have a scrap, you can match it at almost any lumber-yard.—*Jackson Hand, Westport, Conn.*

►►►WANT to save running down to your basement workshop and back again for each minor repair on the first or second floor? Best way is to fit and keep a simple toolbox in a drawer or closet on each floor. A typical repair kit might contain: claw hammer, two or three screwdrivers, knife, pliers, hand drill with three or four most-needed bits, adjustable wrench, compass saw and a folding rule or steel tape.—*John Granger, Wood-Ridge, N. J.*

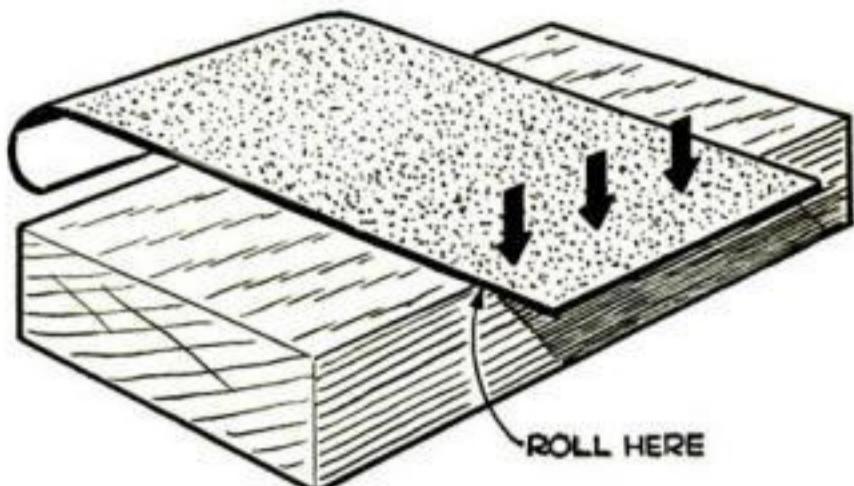


Handy Accelerator Depressor

THE adjustable stop rod from a table saw is a help for some work on the car. Propped between front seat and accelerator pedal, it will keep the accelerator depressed to a fast idle or whatever speed you need for making an adjustment. It's better than hunting a board of the right length.—*Joseph H. Allen, Hartford, Conn.*

Short Cuts and Tips

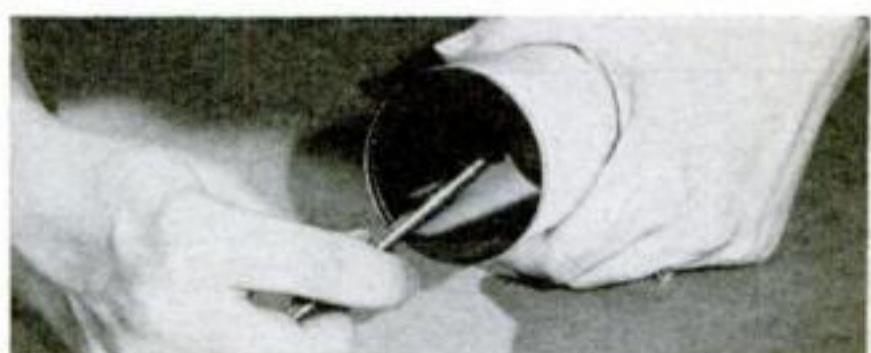
FROM PS READERS



Putting Abrasive in Sander

WHEN you prepare abrasive paper for an electric sander, you can slip it into place easily if you first roll the edges. Place the sheet sand up with one end over the edge of a bench or block. Press with your palm and roll 1½" on the corner. Repeat for the other end. This makes the ends flexible so they pull into place.—*J. Hugh Capron, Winona, Minn.*

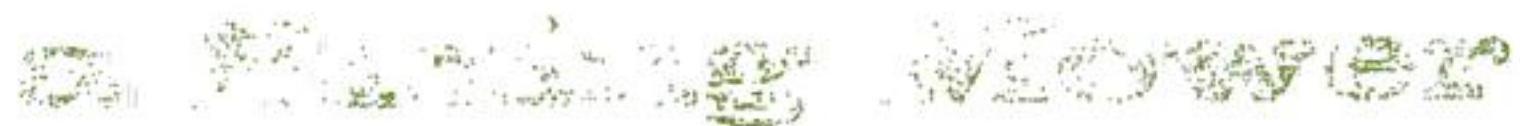
►►►THE simplest and least expensive way to cure a saturated septic-tank drainage field is with vertical holes at the edge reaching down to sand or another porous strata. You can borrow or rent a post-hole or well-drilling auger with an extension handle that will make holes 10' to 15' deep. Line the hole—or holes if you have to dig several—with concrete drain tile, and the water will disappear.—*Tom E. Clarke, Seattle, Wash.*



How to Call Ducks

IF YOU are caught hunting without a duck call, you can make one in seconds from a bolt and small tin can. Cut both ends from the can and draw the threaded part of a large bolt firmly across the edge. You'll find you can vary the tone by the way you cup your hand or draw the bolt.—*Frank A. Javor, East Orange, N.J.*

Why You'd Like



Whether they're Rube Goldbergs or hot rods, the rider mowers share one feature: They're fun!

By Joan Steen

REMEMBER the first time you sat behind a steering wheel and drove a car? You can get some of that same thrill driving a riding mower. Weekend chores turn out to be fun as you propel yourself around your yard in one of these baby cars.

And you can have one for not much over \$100. There's a swelling trend to get a "rider," as they are called. This year $\frac{1}{4}$ million will be bought. That's a fraction of the $3\frac{1}{2}$ million mowers sold annually, but it's double last year's sale of riding mowers.

Is a rider for you? Obviously, not all these machines are bought by estate owners. Then who is buying them? Should you?

Maybe. Besides the lure of fun and

lower prices, their big appeal is that they're not just a tool to cut grass, but a year-round machine for yard care. They'll shovel snow in winter, cultivate in spring, mow in summer, sweep leaves in fall.

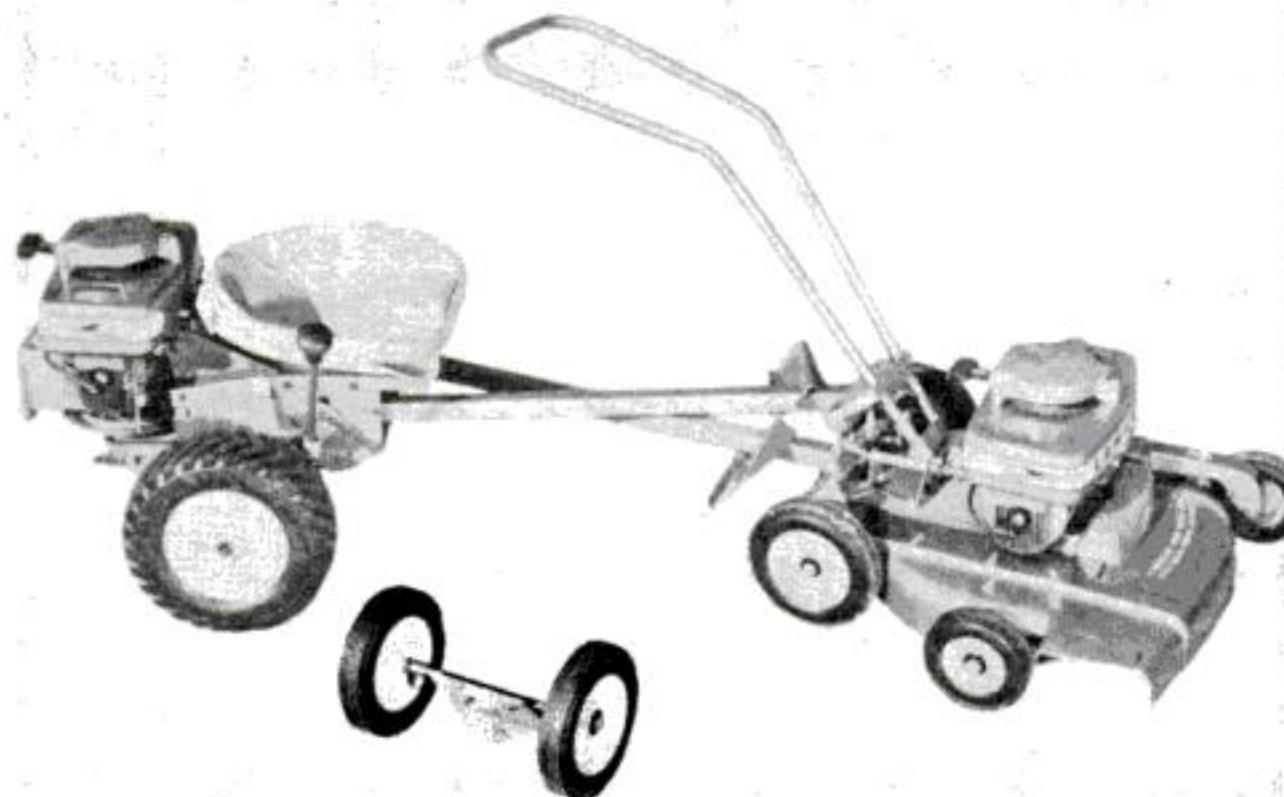
Of course, you won't get all that for \$100. The price range for riding mowers is wide. If you just want to dispose of a Saturday-morning chore by sitting on a seat with an engine behind it and a cutter in front, the low-priced item may be for you. But if you want a machine that will pay its way from May to September, the fancy models with endless attachments may run you up to \$500.

Elegant ugliness. Outside, these contraptions are handsomely crude, with their engineering anatomy bared to the naked eye. But the stylists have already moved in. This year you'll see more engines shrouded (though it won't cut noise much); more color, chrome, and trim to appeal to wives; and better contoured seats packed with foamier rubber.

What's best for you? That'll depend on:



A THREE-WHEELER packages its power in a cast-aluminum housing, and—surprising for its size—boasts gearbox transmission. Pennsylvania's Lawndale model sells for \$185.



A VERY LOW CENTER OF GRAVITY is said to give Lawn-Boy's Loafer sulky the stability that riding equipment should have. With the mower attachment shown here, it costs \$270.

- Who's going to operate it.
- What other uses you foresee for it.
- The size and shape of your lawn.

Cheapest are the three-wheelers—one smaller wheel in front, two rear ones flanking a Briggs & Stratton, Clinton or Ilawson engine of about three horsepower. They're lightweight, and you should feel properly wary guiding them along slopes.

Steering is by tiller or handlebar. (The single-stick tiller feels more wobbly than a two-hands handlebar.)

The cutter is almost invariably a 24" rotary, partly because it hardly makes sense to use anything smaller on a rider, partly because it's just as cheap to produce. 24" and larger cutters are considered farm, not garden, equipment and therefore are not subject to excise tax.

The transmission is usually a belt-chain combina-



WHIZZING OVER WAVING GRASS: this \$400 Reo rider has a top speed of 5½ mph. Its 4½-hp. Reo engine powers a 26-inch rotary blade that can be independently controlled. A handy foot pedal adjusts blade height. For \$40 more, you can get it with battery and generator for self-starting.



A ROLLER AT THE REAR of the \$300 Moto-Mower Roto-Ride provides traction and levels the lawn as you cut, too. Separate blade control and a foot pedal clutch are other features.



STRESSING SAFETY: Jacobsen's \$380 Javelin has completely shielded moving parts; blade separately controlled from wheels, remote engine shut-off, rigid steel frame, large tires.

The '59 Riders:

CUTTER

MAKE AND MODEL	PRICE	WEIGHT (pounds)	WIDTH (inches)	Height of Cut (lowest to highest in inches)	Method of Height Control	Independent Blade Control?	Blade Lock?	Make
WIZARD	2XC2940	\$115	155	24	1½-3½	blade spacers	no	no Clinton
SEARS, ROEBUCK	8838	\$120	230	24	2 -3	blade spacers	no	no Craftsman
MONTGOMERY WARD	TDZ92A	\$150	140	24	1¾-3¼	wheel positioning	no	no Clinton
SPIEGEL	Musgrave BXU925	\$160	216	24	1½-2½	blade spacers	yes	yes Clinton
WIZARD	2XC2941	\$160	170	24	1½-3½	blade spacers	no	no Clinton
SEARS, ROEBUCK	Craftsman 8839	\$170	180	24	2 -3	blade spacers	no	no Craftsman
EVERSHARP	414b	\$180	158	24	1 -3	wheel positioning	yes	no B&S
SPRINGFIELD	EC59	\$180	178	24	1½-3	deck bolts	no	no Clinton
PENNSYLVANIA	Lawndale	\$185	125	21	1 -3	wheel positioning	no	yes B&S
SAVAGE	Model 92b	\$188	154	21	¾-1¾	roller adjustment	yes	no B&S
SAVAGE	Model 16	\$190	124	22	1 -2¾	wheel positioning	no	no B&S
MOW-MASTER	Fairlawn 350	\$190	170	24	1½-2½	blade spacers	no	yes B&S
DILLE & MC GUIRE	Turfmaster TR/3	\$200	210	21	1 -3	lever on deck	no	no B&S
BOLENS	Suburban Rider	\$200	185	24	1½-2½	blade spacers	yes	no Lauson
TORO	Colt	\$209	240	25	½-¾	roller adjustment	yes	no B&S
PENNSYLVANIA	Reel-Rider	\$215	156	21	¾-2	wheel positioning	yes	no B&S
WIZARD	2XC2945	\$220	203	25	1½-5	wheel positioning	yes	yes Clinton
MUSGRAVE	B-1400	\$230	230	24	1¾-3½	blade spacers	yes	no Clinton
MONTGOMERY WARD	TDZ95A	\$240	165	25	1¾-3¼	wheel positioning	yes	yes Clinton
SEARS, ROEBUCK	Craftsman 8850	\$280	230	24	1¾-3¾	wheel-adjusting lever	yes	yes Lauson
MOW-MASTER	Fairlawn 450	\$280	250	25	1½-3	lever under seat	yes	yes Lauson
WIZARD	2XC2947	\$300	250	24	1½-3½	pushbutton	yes	yes Clinton
EXCELLO	911	\$300	190	24	1½-3½	wheel positioning	no	no Clinton
MOTO-MOWER	Roto-Ride	\$300	157	24	1¾-3¼	wheel positioning	yes	yes Clinton
YUBA	Choremaster	\$325	300	24	2 -4	deck bolts	yes	yes Lauson
EVERSHARP	4102	\$330	239	24	1¼-3¼	cutter-shaft nut	yes	yes Clinton
EXCELLO	9114-E	\$350	205	24	1½-3½	wheel positioning	no	no Lauson
DILLE & MC GUIRE	Turfmaster TR/4	\$365	365	24	1 -4	lever at side	yes	yes B&S
HOMKO	AE 180	\$370	285	24	1¾-3	crank at front	yes	yes Clinton
SAVAGE	Model 12	\$370	233	26	1½-3½	blade-shaft lever	yes	yes Lauson
JACOBSEN	Javelin 45	\$380	260	26	½-4	blade-shaft lever	yes	yes Clinton
BOLENS	Ridemaster 7467	\$395	390	26	1½-3½	lever on deck	yes	yes Lauson
REO	426-R	\$400	285	26	1½-4	foot pedal	yes	yes Reo
JACOBSEN	Lawnking 12A with rider 62b	\$425	235	26	½-2½	caster-wheel adjustment	yes	no Jacobsen
ECLIPSE	Ranger	\$450	400	26	1¼-3½	lever under seat	yes	yes B&S
PORTER CABLE	Mark 26	\$450	330	26	1½-3½	lever at side	yes	yes Lauson
SULKIES	TORO Power Handle, Sulky and Mower	\$220	104	22	1 -3	wheel positioning	yes	no B&S
	LAWN-BOY Loafer with Mower 7210	\$270	150	21	1 -3	wheel positioning	no	no Lawn-Boy
	HENDERSON Contour Power Pony	\$450	350	30	1 -3	lever at side	yes	no B&S

NOTES: n.a., information not available from manufacturer;

*two-cycle engine

tion, though some (Wizard, Sears, Pennsylvania) offer a gearbox even in the low-price group. Whether you get a differential to smooth out and equalize power at the rear wheels is a 50-50 possibility. Some three-wheelers power only the single front wheel—which provides

less traction, but eliminates the need for a differential.

At the high end of the price line, you get more power, four wheels, automotive-type transmission and differential, dashboard control, independent blade operation. Here's a breakdown of features:

How They Compare

ENGINE

RUNNING GEAR

Location	Horsepower at what R.P.M.	Wheels	Steering	Inner Diameter of Turning Circle (feet)	Reverse?	Transmission to Wheels	Differential	Is Drive Mechanism Enclosed?	Electric Starter Available?
under seat	2½ @ 3,800	3	handlebar	5	yes	gear & chain	overriding pawls	partially	yes
center	3¼ @ 3,600	3	tiller	4	yes	gear & chain	none	partially	no
under seat	3 @ 3,600	4	handlebar	8	yes	gear & chain	none; drive wheels closely spaced	partially	no
front	3¼ @ 3,600	4	handlebar	n.a.	yes	gear & chain	geared	completely	n.a.
front	3¾ @ 3,600	4	handlebar	5	yes	gear & chain	overriding pawls	partially	yes
center	4 @ 3,600	4	handlebar	4	yes	gear & chain	none	partially	no
under seat	3 @ 3,600	3	handlebar	4	no	belt	n.a.	partially	no
front	3¼ @ 3,600	4	handlebar	3	yes	gear & chain	none	completely	no
under seat	3 @ 3,600	3	handlebar	4	no	gear & belt	gear & pawls	completely	yes
under seat	2 @ 3,600	3	handlebar	1	no	belt & chain	overriding pawls	partially	no
under seat	3 @ 3,600	3	handlebar	1	no	belt & chain	overriding pawls	partially	no
front	3 @ 3,600	4	handlebar	2½	yes	gear & chain	geared	partially	no
under seat	3 @ 3,600	3	handlebar	1	yes	belt & chain	front-wheel drive	completely	no
center	3 @ 3,600	4	handlebar	4½	yes	gear & chain	geared	completely	yes
center	2¾ @ 3,600	3	handlebar	3	no	gear & chain	overriding pawls	partially	yes
rear	2¼ @ 3,600	3	handlebar	4	no	gear & chain	overriding pawls	partially	yes
front	4½ @ 3,600	4	handlebar	5	yes	gear & chain	overriding pawls	partially	yes
rear	4½ @ 3,500	4	handlebar	4	yes	gear & chain	overriding pawls	completely	no
under seat	3¾ @ 3,600	2	handlebar	6	yes	gear & chain	roller driven	partially	no
center	4 @ 3,600	4	handlebar	6	yes	gear & chain	geared	completely	no
front	4½ @ 3,600	4	handlebar	3	yes	gear & chain	geared	partially	yes
front	4½ @ 3,600	4	handlebar	5	yes	gear & chain	geared	completely	yes
front	4½ @ 3,600	3	handlebar	2	yes	gear & chain	none	completely	no
under seat	4½ @ 3,600	2	handlebar	7	yes	gear & chain	roller driven	partially	yes
rear	4 @ 3,600	4	handlebar	5½	yes	gear & chain	overriding pawls	partially	yes
rear	4 @ 3,600	4	handlebar	8	yes	gear & chain	geared	completely	yes
front	5½ @ 3,600	4	handlebar	5	yes	gear & chain	none	completely	std. eqpt.
front	4½ @ 3,600	4	handlebar	7	yes	gear & chain	geared	completely	no
front	4½ @ 3,200	4	handlebar	3½	yes	gear & chain	geared	completely	no
under seat	4½ @ 3,600	4	handlebar	n.a.	yes	belt & chain	variable-pitch pulleys	partially	yes
under seat	4 @ 3,600	4	handlebar	4½	yes	belt & chain	variable-pitch pulleys	completely	no
under seat	5½ @ 3,600	4	wheel	6½	yes	gear	geared	partially	yes
under seat	4½ @ 3,600	4	handlebar	7	yes	friction	geared	completely	yes
front	3 @ 4,000	4	handlebar	2½	no	chain	geared	completely	yes
front	5½ @ 3,200	4	wheel	2½	yes	gear & chain	geared	completely	n.a.
front	4½ @ 3,600	4	handlebar	4½	yes	gear	geared	completely	yes
rear	3 @ (n.a.)	4	handlebar	n.a.	no	gear	geared	partially	yes
rear	2½ @ 4,000	6	handlebar	10	yes	friction	geared	completely	yes
rear	5¾ @ 3,800	4	handlebar	2	yes	belt & chain	geared	partially	yes

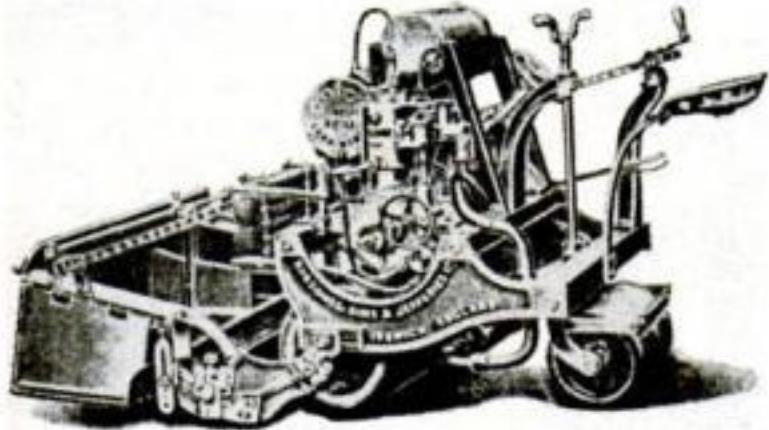
^b reel type—others are rotaries;

^c engine has remote shut-off control.

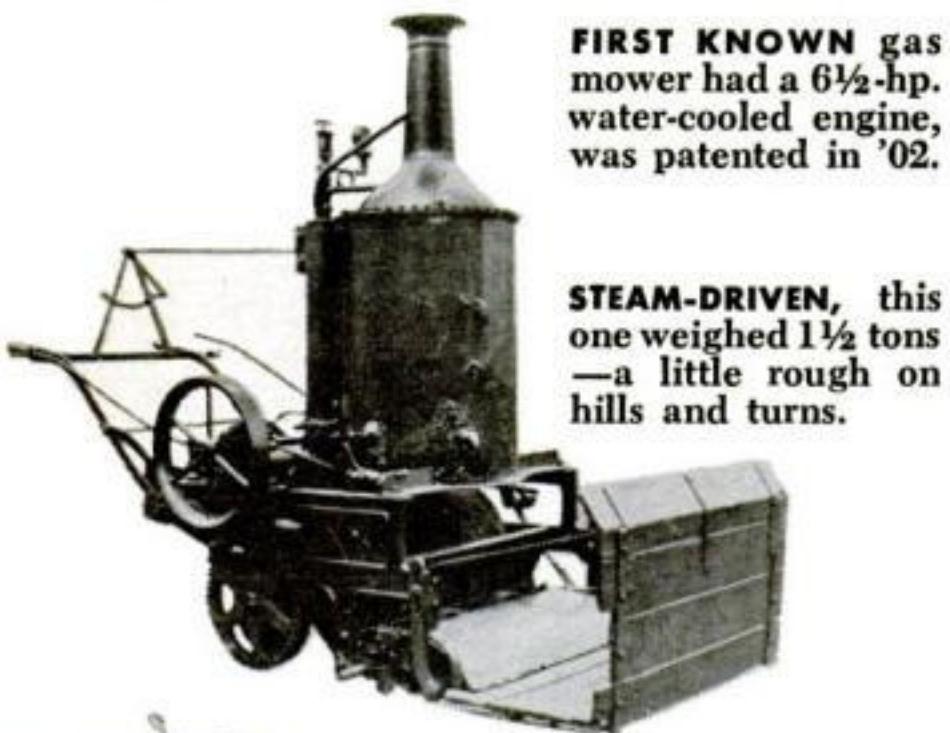
Engine: A few companies (Lawn-Boy, Jacobsen, Reo) make their own. Most use two- to six-hp. standard makes. For a four-cycle engine (most common), a safe minimum is 3½ horsepower. If the engine is in front or under the seat, check for protection against seared shins.

Starting: Most of the models in the spec chart stick to the recoil starter (automatic rewind). Many makers say they have made improvements—better magnetos, for example, to make starting “a tender pull—the first time.” A few models continue to offer optional electric

**Think power mowers are new?
Dig these old-time monsters**



FIRST KNOWN gas mower had a 6½-hp. water-cooled engine, was patented in '02.



STEAM-DRIVEN, this one weighed 1½ tons—a little rough on hills and turns.



FIRST REAL REEL, this was patented in 1830. Not only did it cut grass, it iron-rolled it, too.



1919 VERSION of a power mower, this bulky, gasoline-fed rig, an early Moto-Mower, had a chain-driven 27"-reel.

starting. Earlier faults—placing the recoil too high or too close to where you're likely to stick your toes near the blade—have been largely corrected, but check.

Stopping: How do you kill the engine in an emergency? On cheaper models you may have to turn around and short the spark plug. Look for a remote shut-off.

Transmissions: Belts, belt-chains, and geared types are sprinkled down the price line. Nothing's wrong with belts—just expect more maintenance. Clutching systems are almost all belt-tightener types.

Differential: To avoid lawn gouging on turns, you'll want some differential action. Lower-priced models may not have any. In the medium-priced range, you'll find non-automotive solutions such as overriding pawls. At the high end, you should expect an auto-type differential.

Speeds: You can go up to seven m.p.h. with some mowers. Most offer one or two forward speeds plus neutral. But not all have a reverse, and if you plan to mow around trees you'd better have it.

Attachments: Besides the leaf mulcher (often included free) there is growing popularity for seeder-spreaders (useful for carting trash around as well), rollers, cultivators, aerators, and sweepers.

What about the mower itself? Preferably it should be separately controlled, but it won't be in the cheaper models. There are three advantages:

- The convenience of driving to and from the lawn without spinning the blade.
- The safety of being able to disconnect the blade if you sight an obstacle.
- And the fun of letting the kids use it as a little car without the mower. (As an extra precaution, many companies add a blade lock.)

Cutters haven't changed much. They're streamlined, some on shorter crankshafts to withstand shock. Housings are larger and there's growing use of aluminum and fiberglass. Toro's introduced a spiral-shaped housing that's said to reduce air turbulence and resist grass clumping.

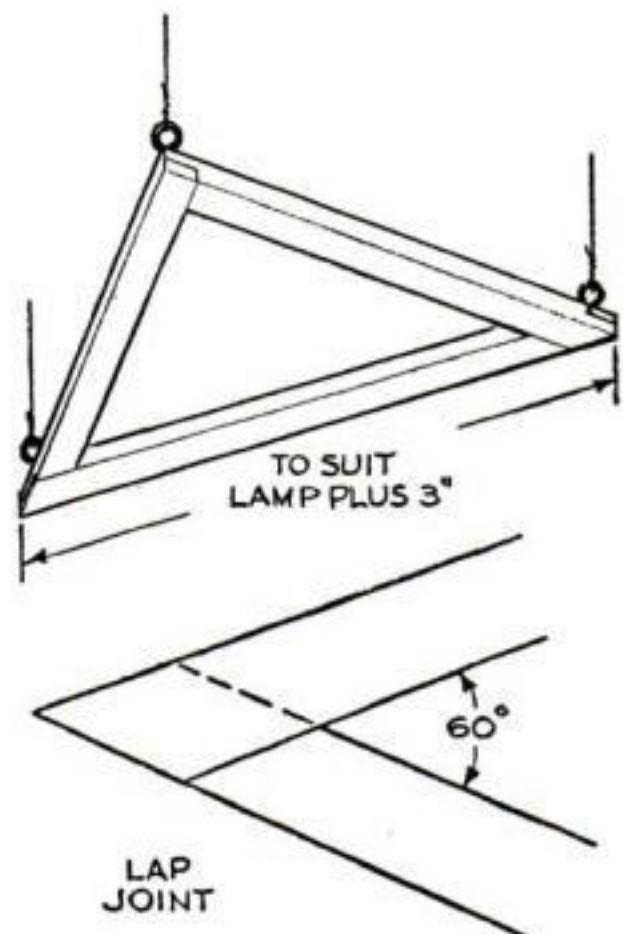
Lawn-Boy has tackled the noise problem with a rubber-shock-mounted, thickly insulated engine and enlarged muffler.

Tomorrow's riders will have more automotive features, maybe aluminum engines with speed governors. Eventually if today's trend continues every house may come with a rider mower built in as standard garage equipment.

END



**Short Cuts
and Tips**
FROM PS READERS

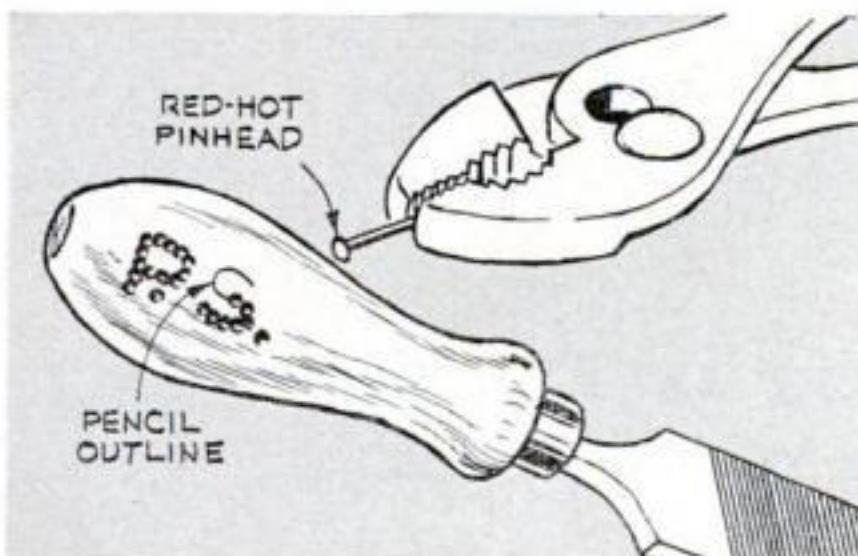


Teamed Fluorescents Eliminate Shadow

If you do drafting by the light of a single overhead fluorescent lamp, you have probably been annoyed by the shadow that it casts on your work. You can eliminate this by mounting three tubes in a triangular fixture. The simplest one is made of wood with lap-joint corners.

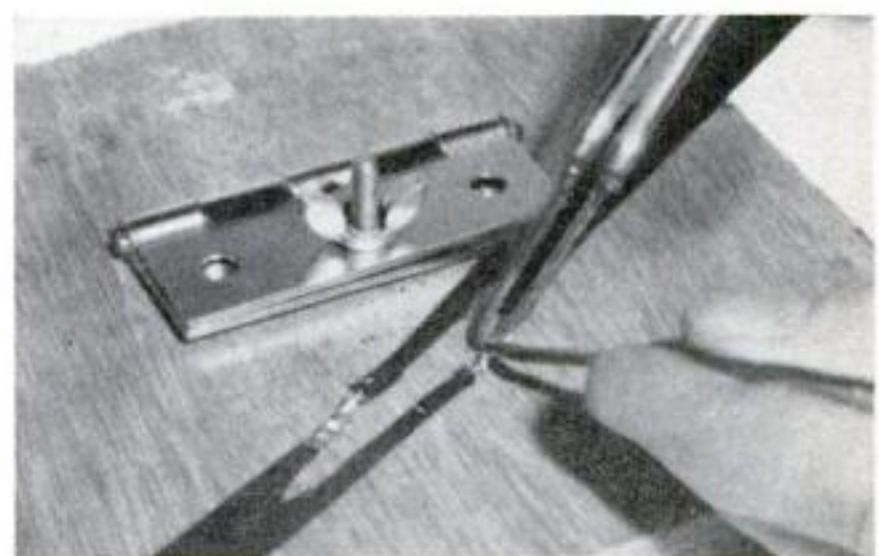
Lengths of one-by-three stock are fine.

You can also reduce flicker—caused by the pulsing of alternating current at the rate of 60 times a second—by using a two-lamp, lead-lag ballast in place of the individual ballasts in two of the lamps.—*Hi Sibley, Nuevo, Cal.*



Initializing Leather and Wood

One of the easiest and neatest ways to burn initials in leather, such as a baseball glove, belt or the like, and on wooden tool handles, is with a red-hot pin. Grip the pin with a pair of pliers so you won't burn your fingers. Then heat the pin to redness in a gas, alcohol or candle flame. —*Roger Samuels, Commack, N. Y.*



Hinge Vise for Small Parts

If you sometimes find it almost impossible to hold small parts in place for soldering, mount a leaf hinge on a scrap with a wing nut and bolt that will go all the way through. This little vise is great for holding small wires and other parts gripped between the two hinges.—*John A. Comstock, Wellsboro, Pa.*

**Good advice from a TV repairman:
Keeping a set cool, dry and clean is a sure way of—**

Cutting Your TV Service Bills

By Art Margolis

WHEN I pulled up to Jackson's modest home, Doc Glover's car was parked outside. A worried Jack Jackson let me in, put a finger to his lips, and led me down to the basement TV corner.

"Between you and the Doc, I'll never get ahead," he said. "I work to support you both. The kids have some more colds and the TV is busted again."

I didn't know how many calls Doc had made, but I had to admit Jack had had his TV headaches. This was at least my tenth visit in the last six months.

I turned on the set. The picture was shrunk in on four sides, and two heavy, inch-thick, black bars rolled down through it. There was a loud hum. "Looks like filter trouble," I told Jack.

With the chassis on the floor, I began checking the filters by substitution, one after another. The third one I substituted cleared the condition. I checked out the set and put it back in the cabinet.

Jack took my bill. "Mind if I pay you

at the end of the month?" He sighed. "Isn't there some way to stop that thing from breaking down all the time?"

I looked around. The walls were sweating moisture. Water droplets glistened on the overhead pipes. There was even a fine sweat on my caddy case from just the hour I had been there. As I started to speak, Doc Glover's booming voice came from upstairs, "Nothing serious, Sarah, just colds again."

"Yes, Jack," I said, "there is something you can do. One of the worst enemies of electronic equipment is moisture. It gets into the components of a TV, breaks down insulation, condensers and tube sockets, and even lets high voltage leak. You could almost say your TV keeps 'catching colds' because its resistance is kept low in this damp basement."

As I spoke, I heard Sarah say, "Doctor, what can I do?"

Jack echoed, "Art, what can I do?"

"The best solution, till you get rid of the moisture down here, is to move the

3 Health Rules for a TV Set

EVEN though it is an inanimate object, a television set responds well to some of the same rules of health that you do. For example, you should:

1. Keep it dry. Remember the many sniffles and sneezes that humans get from being exposed to dampness and moisture?

2. Keep it cool. Can you work well when

torrid summer temperatures reduce you to a limp rag?

3. Keep it clean. Would you sit down at a meal with dirty hands?

Now see the accompanying article for the reasons why these simple rules for human health apply equally well to your television set.



*The picture was shrunk in, and two
inch-thick black bars rolled down through it.
"Looks like filter trouble," I told Jack.*

TV up into the living room where it isn't damp."

Then came Doc's bass-drum voice, "Don't let the kids go into the basement, Sarah, until you get rid of the dampness. Move the TV into your living room."

I reinstalled the TV upstairs. It hasn't needed service since then, and I hear from Doc that the kids haven't had a single cold.

There's a money-saving tip here for

you as a TV owner—have your viewing area in a dry place. But that's not all. There are other equally important steps you can take to keep your set healthy. They won't mean that you'll never have to call in a serviceman again, or that I'll go out of business. There'll still be plenty of normal maintenance jobs going around to keep me busy.

Normal wear and tear, however, is not the main reason for calling in a TV re-

pairman. In addition to moisture, there are several common household enemies that can attack your set. Here are some more case histories of mine. Maybe you can profit by them to cut down your future TV service bills.

Heat and Sympathy

LAST summer I was a frequent caller at our local advertising agency, which handles a lot of TV commercials. Mr. Borden, the boss, has a TV set mounted conveniently in a wall at one side of his desk. To work on its rear, I have to go into a closet behind the wall.

One scorching day I found Borden close to apoplexy. An important commercial was coming up and there was no picture, no sound. I ducked into the closet. It was like an oven; I could hardly breathe. I found a trouble spot right away. The 5U4 low-voltage rectifier tube was out cold.

I installed a new tube. The TV came on, but the 6W4 damper tube began arcing internally. I replaced it and went outside. A picture came on, but shrunken in from the sides. I replaced the 6BG6 horizontal output tube. Then a white fold-over at the picture bottom sent me back to replace the 12BH7 vertical-output tube. The sound was a bit muffled. A new 6K6 audio-output tube cleared that.

Now the TV picture looked good, but I was drenched with perspiration. After reviving myself in the washroom, I made out a bill that was close to \$20 and

handed it to Borden, who was dictating to a cute secretary. He took one look at the bill and harrumphed. "That TV set eats tubes like peanuts," he complained. "It isn't the money, but when I switch it on I want a picture—and sound. Why does it keep breaking down so often?"

I had the answer. "Mr. Borden, any piece of electronic gear produces heat like a little radiator. Your 26-tube heater is mounted in an unventilated closet. The heat has no place to go. It gets hotter and hotter, and hard-working tubes like those output ones I just changed die from heat prostration. You'll keep burning out parts unless you take steps to cool things off around here."

The wilting blonde beside his desk looked up hopefully.

Borden took a cigar from a humidor and rolled it between his fingers. "What would you suggest?"

"Either air-condition your offices or ventilate that closet."

The blonde looked expectantly at her boss as he spoke. "If you think I'm going to spend \$5,000 on air conditioning to keep a TV set cool, you're crazy. I'll have a ventilating fan put in."

A week later I received another call. The heat wave was still on. One of the agency artists was sitting on a high stool in front of a drawing board wearing gym shorts. The door of Borden's inner sanctum was open, and he yelled, "Fine TV man you are. It's conked out again." His secretary looked up and winked.

I examined the TV. No sound or pic-



In and out. A white foldover at the picture bottom sent me back to replace the 12BH7 vertical-output tube.

ture. I went into the closet. The fan was whirring and it was comfortable in there. I opened the TV rear. Lo and behold, the 5U4 tube was out of its socket, lying along the side of the cabinet. It had been deliberately removed from the socket.

As I walked into the office holding the 5U4, the cute young thing gave me a pleading look. Borden looked disgusted.

"What do you think, Art?" he said. "Will this TV heat prostration stop if I air-condition the place?"

I hesitated, looked at the blonde. "Well," I answered truthfully, "you'll never have the type of trouble I've just found if you do."

"Set it up, Mary," Borden snapped.

She hurried out. I could hear a growing hubbub out in the front office. Since I'm supposed to guarantee my work, I couldn't very well charge for reinserting a perfectly good tube. I chalked the lost service charge up to my good deed for the day.

A Clean-Up Job

WHEN my Aunt Kate phoned me one Sunday at home with a last-minute invitation to a family supper, she warned me to come prepared to fix her TV set. The local Clean Up Your City League was sponsoring a television program that evening.

Now, missing a program like that may not seem important to you and me, but Aunt Kate has a phobia about dirtiness. Among her contemporaries, she is affectionately known as Crazy Clean Kate.

When I arrived at her house, a large group of my distant relatives were gathered in the living room, sipping tomato-juice cocktails. Aunt Kate, sitting majestically in a high-backed wing chair, dominated the room. I wondered which one of them she was singling out as her cleanliness scapegoat. I didn't have long to wait. She raised a heavy cane, thumped its rubber tip on the floor, and started lambasting her daughter-in-law Harriet, my cousin Joe's new bride.

Shouting my hellos over her tirade, I tackled the TV set. There was a dim brightness on the screen but no sound or picture. Twisting the volume control brought a scratchy noise. When I tried the contrast, dark streaks ripped through the brightness. I turned the horizontal



The trouble was grime and dirt... After I cleaned off the picture-tube face, brightness increased tenfold.

control. The set squeaked as the oscillator died and came on.

In the background I could hear my aunt berating Harriet. "Your apartment was a disgrace last time I was there. Dirty dishes in the sink! You'll never find dirty dishes in my sink."

Harriet, her fists clenched, was controlling herself. But I saw an explosion coming up, and broke in. "Aunt Kate, I'm going to take your TV set with me."

She stopped her attack on Harriet and turned on me. "Why? What's wrong with it?" She waved her cane. "Arthur, you're covering up. You don't know what's wrong."

I smiled. "Yes, Aunt Kate, I know what's wrong."

Her lips tightened. "If you know what's wrong, Arthur, you fix it right here!"

"Okay, Aunt Kate." I shrugged my shoulders and went to work. She is still trying to live down the repair job I made on the floor in front of her family circle.

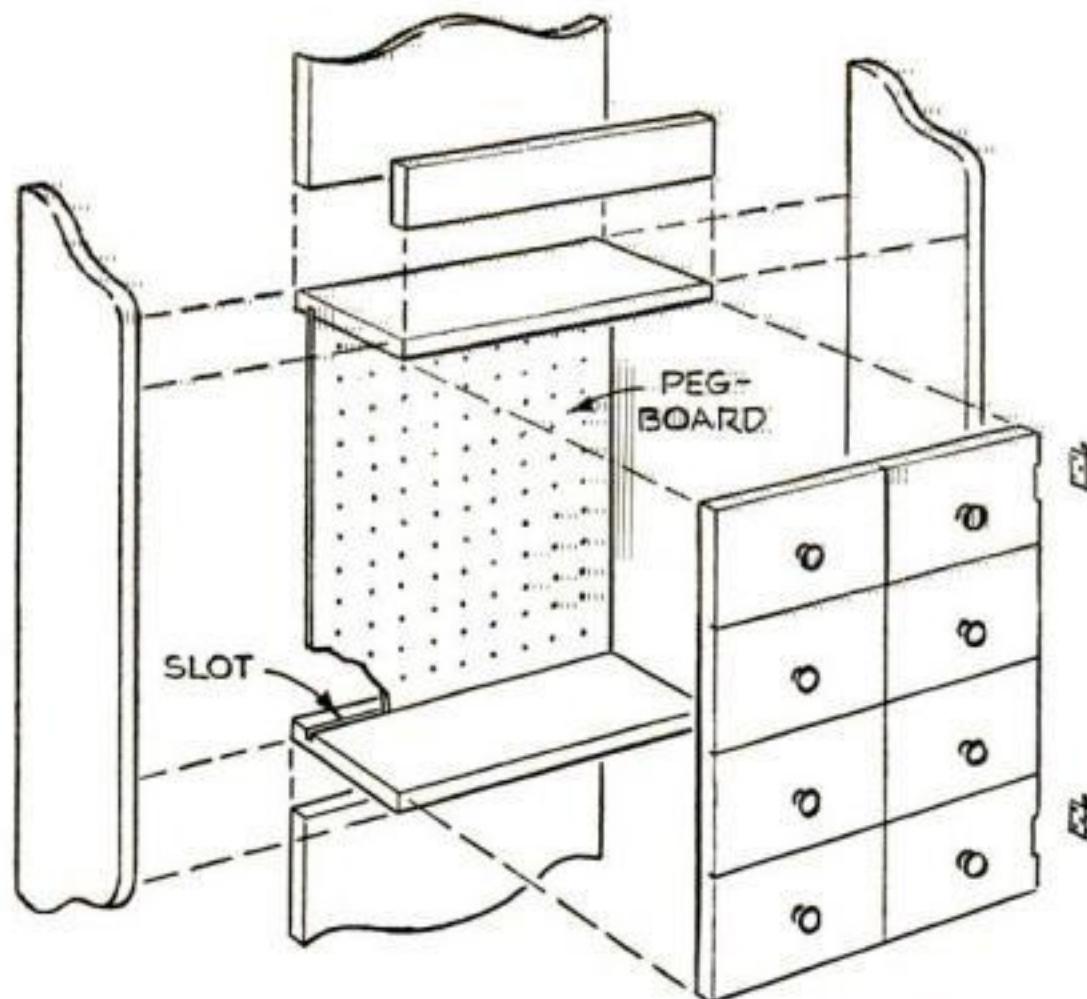
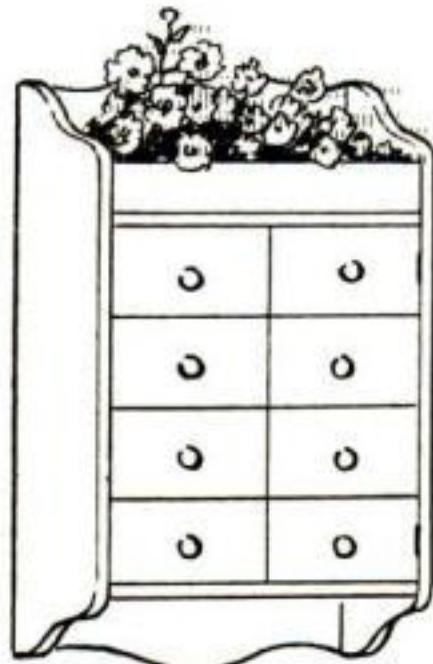
You see, the trouble was grime and dirt. The sound and picture came on when I cleaned the tuner out and worked on the tuner contacts with some solvent. The scratchy sound stopped when I put solvent into the volume control. A squirt of solvent in each control cleared up the contrast and horizontal troubles. After I had cleaned caked grime off the picture-tube face, brightness increased tenfold.

Watching me, Crazy Clean Kate almost went clean crazy with embarrassment.

END

Short Cuts and Tips

FROM PS READERS

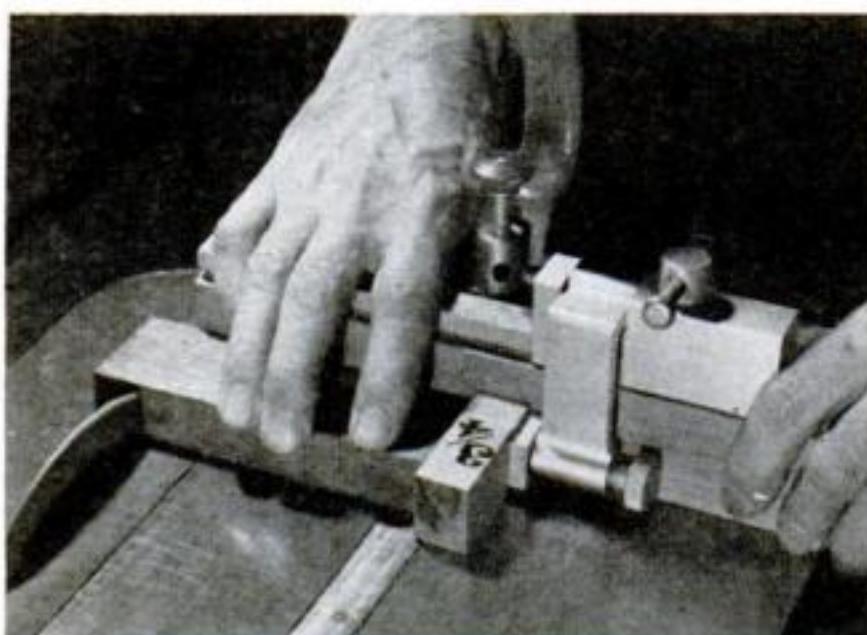


Tool Cabinet Disguised as a Hanging Garden

APARTMENT dwellers with little extra space to store frequently used tools will find this hanging box both a convenience and a handsome decoration. It is disguised as a hanging-drawer unit and is topped with a planter for growing vines.

The business part of the box is a peg-board back on which a hammer, pliers, screwdriver and other tools can be hung. The box is built around it. The front is scored to look like drawer fronts and hinged on one side.—S. J. Zuk, Troy, Mo.

Gauge Blocks for Circular Saw

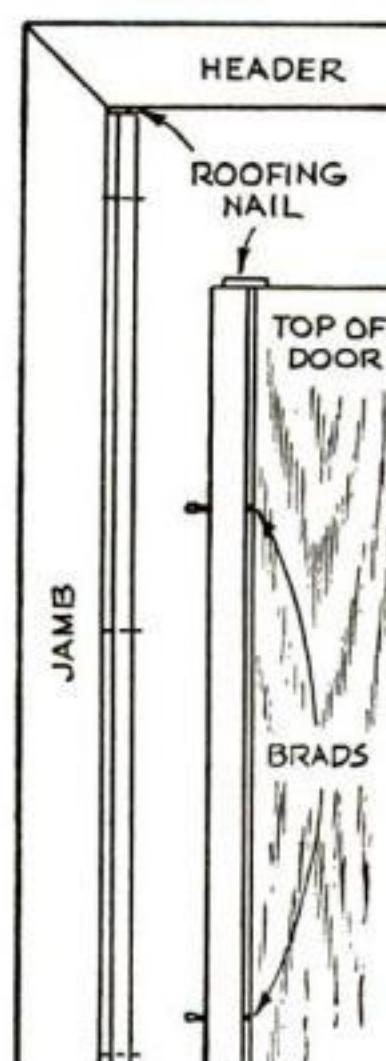


AN ASSORTMENT of hardwood blocks in $\frac{1}{8}$ " steps from $\frac{1}{8}$ " to $1\frac{1}{2}$ "-or-so thick can save time when you saw work to length with the aid of a miter gauge equipped with an adjustable stop. After setting the stop for the greatest length, slip in blocks to cut shorter pieces.

You'll find this stunt useful on such jobs as cutting the sides of a square box where end pieces are shorter. Be sure to mark sizes where they will be seen.—Walter E. Burton, Akron, Ohio.

Locating Hinges on a New Door

HERE'S an easy way to locate the hinges when you're hanging a new door. Drive a roofing nail into one end of a 6' length of wood $\frac{1}{2}$ " thick so the head overhangs.



Put in a brad at the point selected for the top edge of each hinge. Then hook the roofing nail over the top of the door and tap the brads in to mark the spots for the hinges.

Next, remove the strip and place it against the jamb with the roofing nail touching the header. Tap the brads to spot the other paired leaves of the hinges. The thickness of the nail head will give ample clearance for closing the door.—Ervin Brackendorf, Lemay, Mo.

8 Lawn and Garden Tips

ELECTRIC-HEDGE-CLIPPER CORD is less likely to be cut accidentally if you wrap the first four or five feet with white adhesive tape. This makes it stand out clearly, instead of blending inconspicuously with the dark foliage.



PLAGUED WITH MOLES OR GOPHERS in your lawn or garden? You can discourage them by dropping a few camphor mothballs into their tunnel openings.



TO PREVENT SUCKER AND SHOOT GROWTH after cutting down a tree, bore a number of $\frac{3}{4}$ -inch holes about six inches deep in the top of the stump and fill them with ammonium sulphate. It's safe to handle, but it's death on roots when the sap carries it to them.



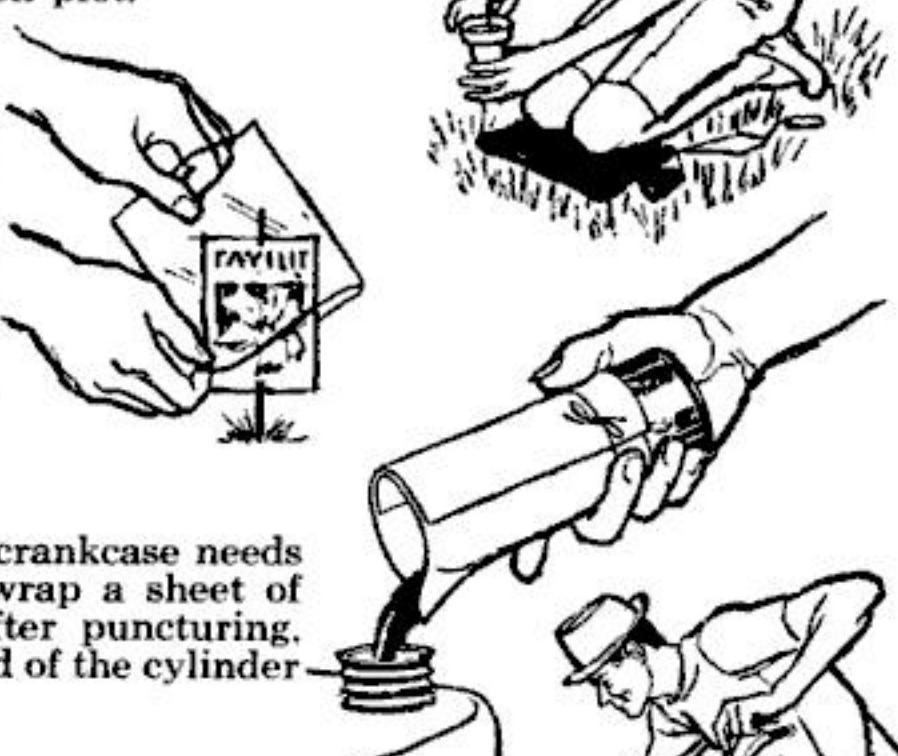
BIRDS EAT FEWER GARDEN SEEDS if a plentiful supply of other feed is available. Place inexpensive scratch feed in a broad, shallow pan attached to a pipe set in the ground at one side of your garden or lawn.



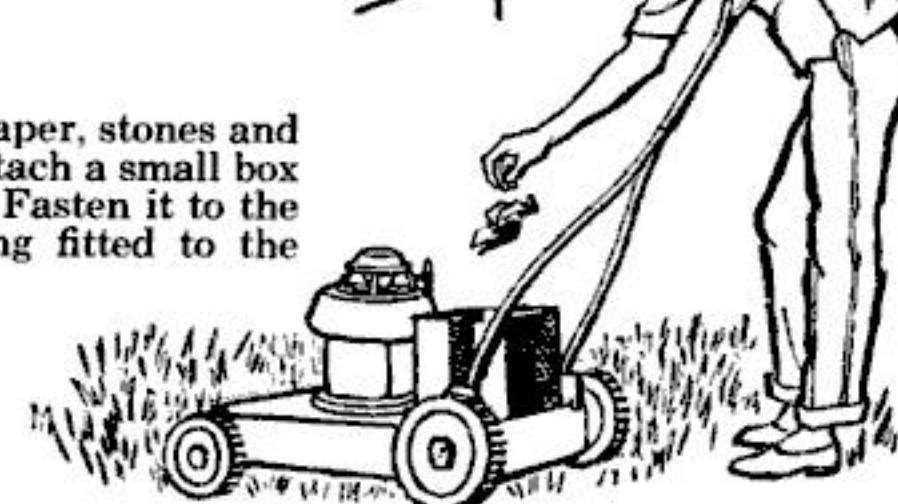
A DISCARDED HOT-WATER BOTTLE makes a handy kneeling pad when you're working in a wet garden plot.



PROTECT EMPTY SEED ENVELOPES used as garden row markers by slipping old plastic food bags over them. If you customarily place the envelopes on stakes, the transparent plastic will keep them clean and dry. Or, if you wish, just fold the envelopes inside the bags and lay them on the ground, with stones to hold them in place.



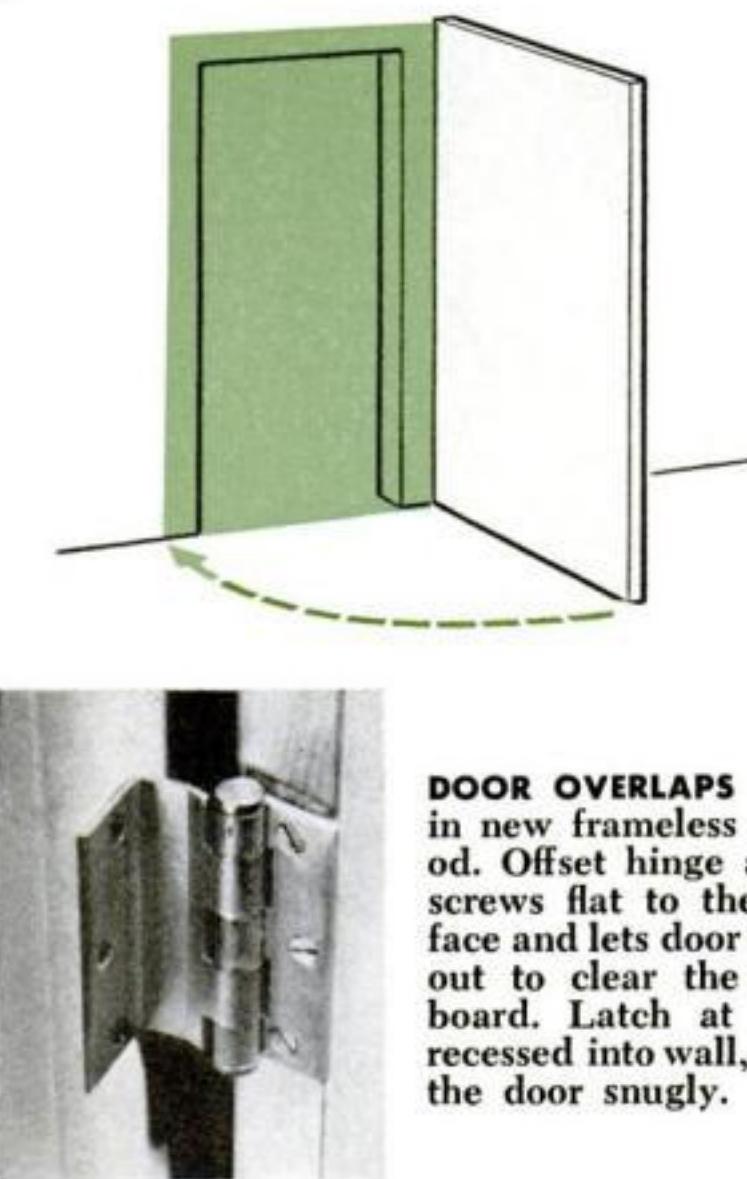
HERE'S A POWER-MOWER TIP: When the crankcase needs refilling and you've misplaced the funnel, wrap a sheet of aluminum foil around the motor-oil can after puncturing, secure it with a rubber band and crimp the end of the cylinder to form a spout.



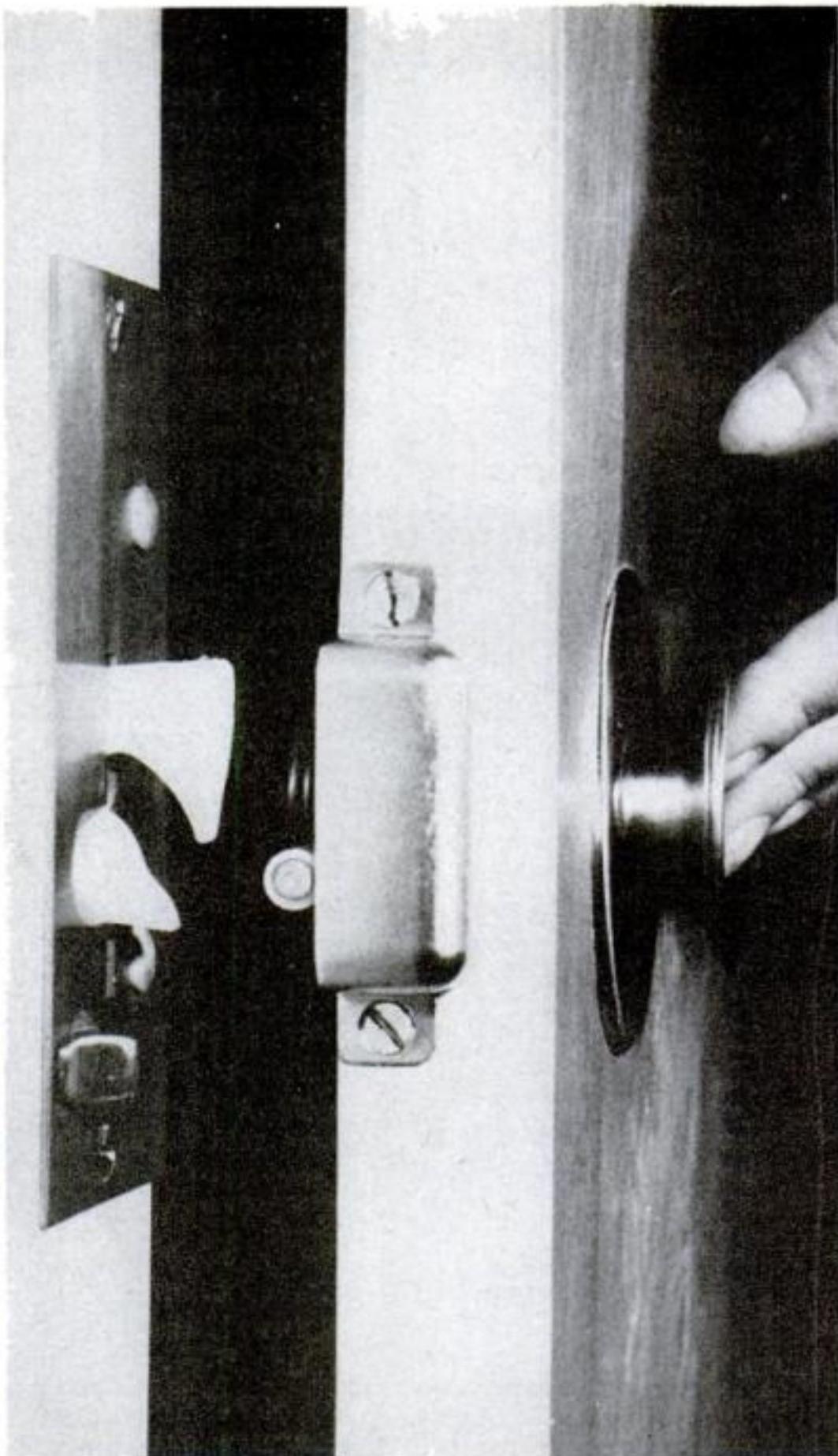
NEED A CONVENIENT RECEPTACLE for paper, stones and other trash picked up while cutting grass? Attach a small box to your power mower just behind the motor. Fasten it to the mower housing with a length of door spring fitted to the handle's base brackets.

You'll find a new kind of latch, a new architectural concept in these—

Household Doors That Never Stick



DOOR OVERLAPS WALL in new frameless method. Offset hinge at left screws flat to the wall face and lets door swing out to clear the baseboard. Latch at right, recessed into wall, holds the door snugly.

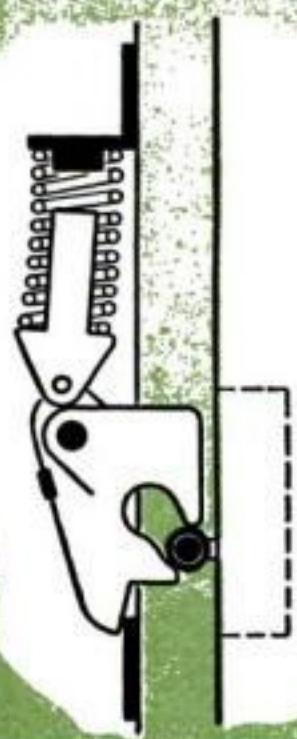
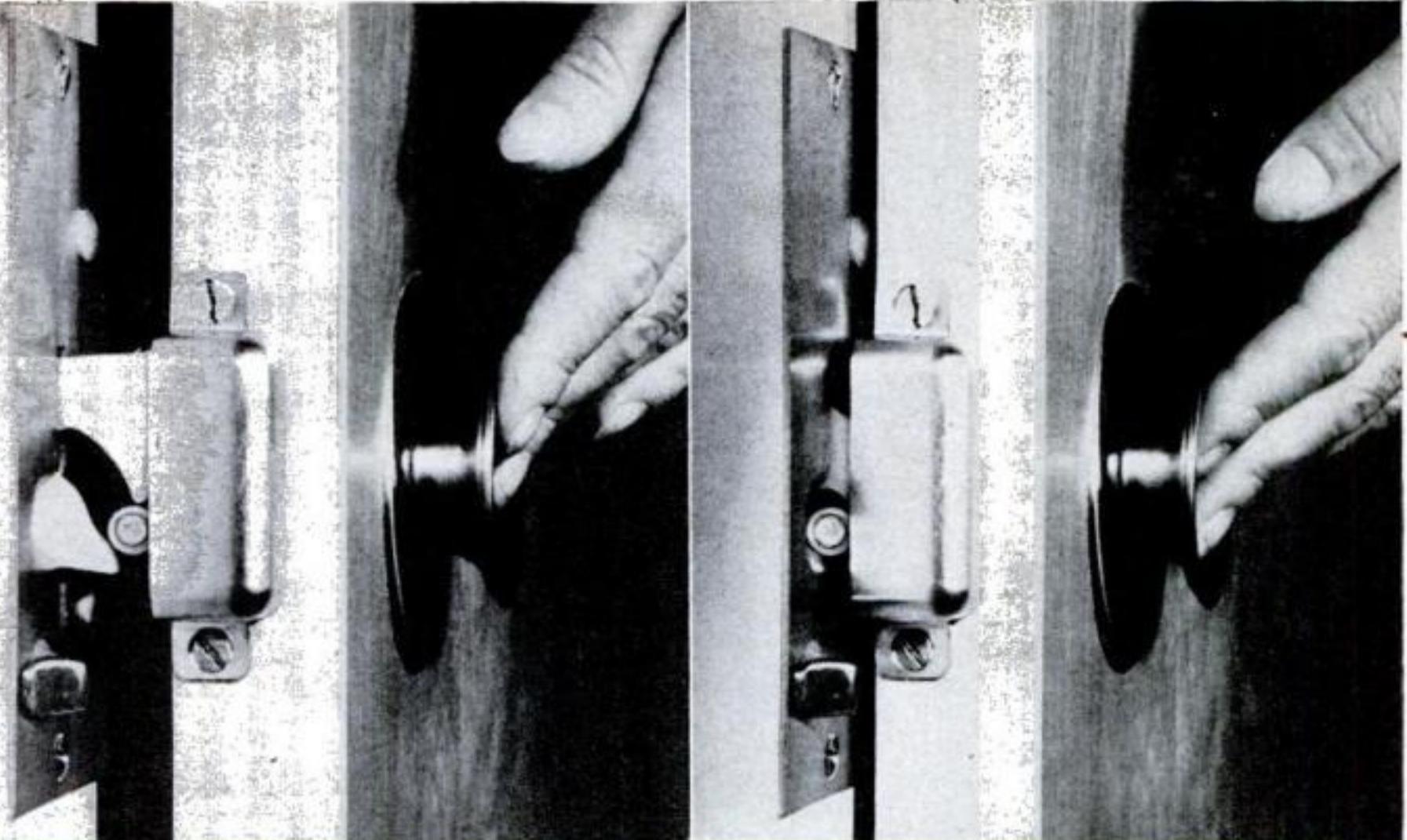


NEW hardware for your home makes stickproof doors by simply reversing the old way of putting them up. There's no latch on the door—it's on the wall instead. There's no knob to turn—you just give the door a gentle push or pull and it closes and opens by itself.

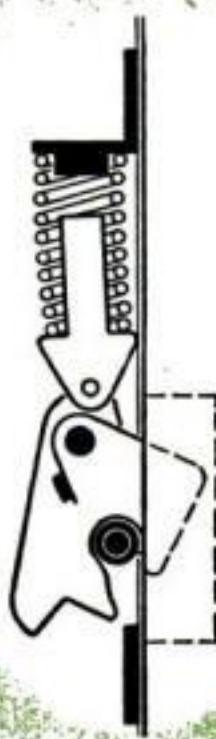
This ingenious scheme, developed by Stanley Hardware, now makes possible a brand-new method of mounting doors so they overlap the opening in the wall, instead of trying to fit inside it. The door is actually hinged directly to the face of the wall—right against the wallpaper or other surface. This means it can't jam, sag or warp out of place even if the house settles or the door itself warps.

The new hardware, to go on sale this month, also makes doors easier and cheaper to hang, whether you put one up yourself in a new room or have them installed in a new home. The doors are mounted as they come, with no finicky trimming to make them fit, no fussing with jambs or stop strips, and no mortising of the edges because the hardware is simply screwed on flat.

The only part requiring carpentry is the latch, which is recessed into the wall. This contains a spring-loaded cam—something like a giant kitchen-cupboard latch—that grabs and holds the door under 12-lb. tension. The door won't rattle or blow open.



AS DOOR CLOSES, tiny roller on its edge begins to engage hook-shaped latch pivoted inside the wall (sketch at left). This tilts the cam-operated latch down, against force of spring above it. Note that roller assembly and wall plate are surface-mounted to save mortising. Roller and latch, both nylon, need no lubrication.



AS LATCH TILTS past midpoint of its pivot, the spring takes over, forcing it down so that it pulls the door closed without your help. Spring then holds door snug against rattles or winds, but lets go easily under a light tug on the knob. Knob has no connection to the latch, can be any kind of decorative grip you want.

Yet a light push or tug—even with your arms full—easily flips the cam in the opposite direction, and the spring pushes the door open for you. Slight misalignment of parts doesn't matter—the door still works, even if Junior playfully closes the latch with the door open.

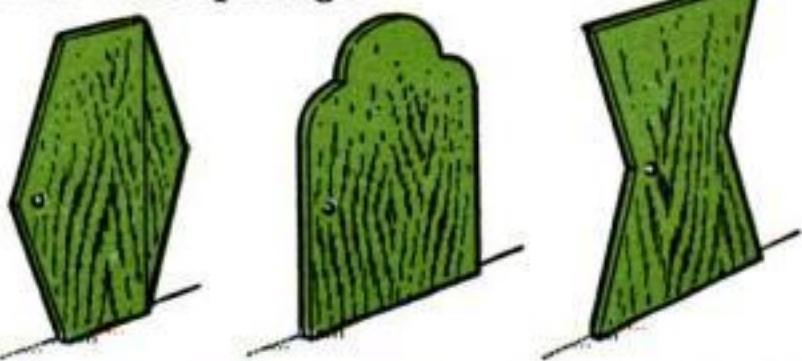
Because you don't need a twist-type knob, any kind of decorative pull can be used. For privacy, you can get a lockable version of the latch.

The present hardware is for interior doors only, but an exterior type is planned. Complete sets in brass, bronze or chrome, or primed for painting, will sell for about \$6 from The Stanley Works, 111 Elm St., New Britain, Conn.

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New door shapes to come?

"DECORATOR" DOORS in dreamy styles may also come from new hardware, now that door shapes no longer need match wall openings.



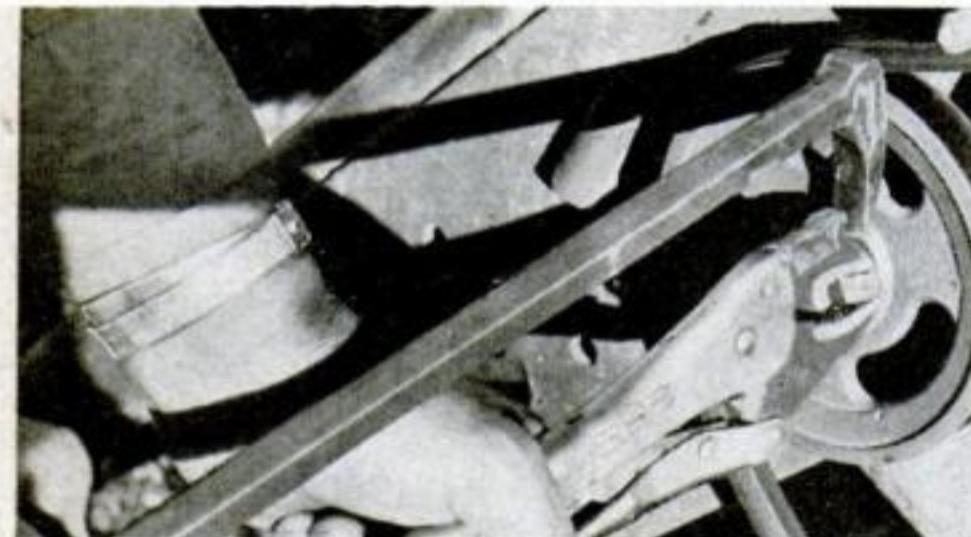
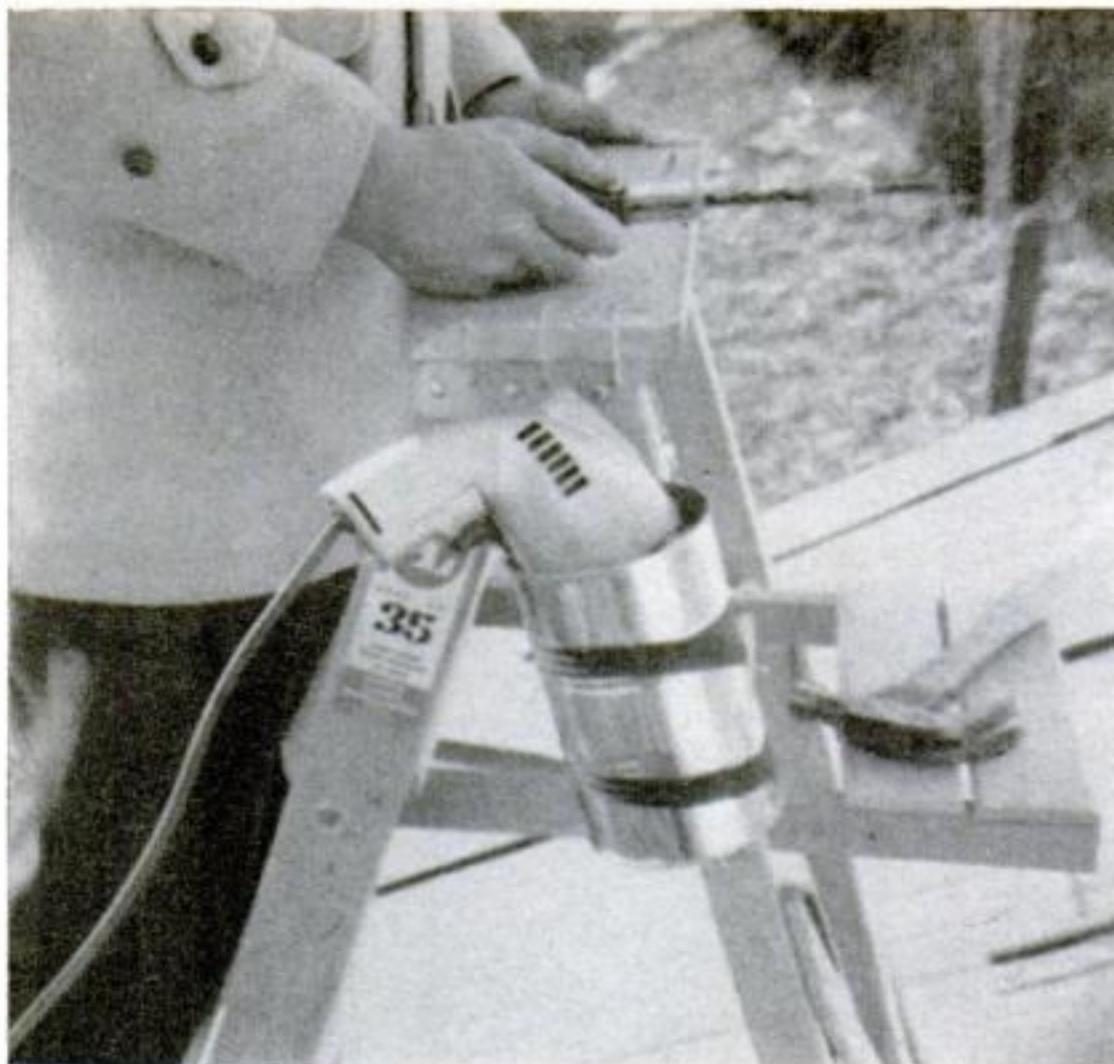
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Short Cuts and Tips

FROM PS READERS

Ladder Holster for Your Drill

NEXT time you use an electric drill from a ladder top, tape a tin can to one of the legs. It will make a good holster, put the drill handy when you are using both hands, and keep it from banging to the ground. A little cloth or newspaper wadded in it will cushion the bottom.—*R. M. Woodbury, Natick, Mass.*



Prying Lip Welded on Clamping Tool

PULLING a long key from a shaft or pulley assembly can be made easy if you weld a lip on the stationary jaw of a clamping tool to provide a grip for a pry bar. Hacksaw the lip to shape from $\frac{3}{8}$ " flat mild steel and braze it to the jaw with its leading edge about $\frac{7}{16}$ " from the tip.—*Ken Hadenfeldt, Storm Lake, Iowa.*

►►►IF YOU need more space for clothes rods, staple wire clothes hangers in line upside down to the beams in the garage or basement. Then rest the rods on the hooks, which also provide storage for fishing rods, molding strips and dowel rods.—*Blanche Campbell, Rivera, Cal.*

Key-Chain Screwdriver

FOR those odd jobs such as removing a lighter refill plug, a small key-ring screwdriver made from a $\frac{3}{4}$ " washer works well. Make two notches with a file, and flatten the projecting "blade." If you want to attach it to your key chain, you drill a small hole near the opposite edge.—*John A. Comstock, Wellsboro, Pa.*



Ironing-Board Bracket Holder

WE MADE a handy ironing-board holder on the back of our closet door with a pair of metal shelf brackets, a half yard of screen-door spring and a few screws.

Before attaching the brackets, we bent the outboard ends up at right angles in a vise. One end of the spring was screwed to the door, the other hooked over a cup hook.—*Flora Clark Gardner, San Angelo, Tex.*





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Get the honest taste of a LUCKY STRIKE

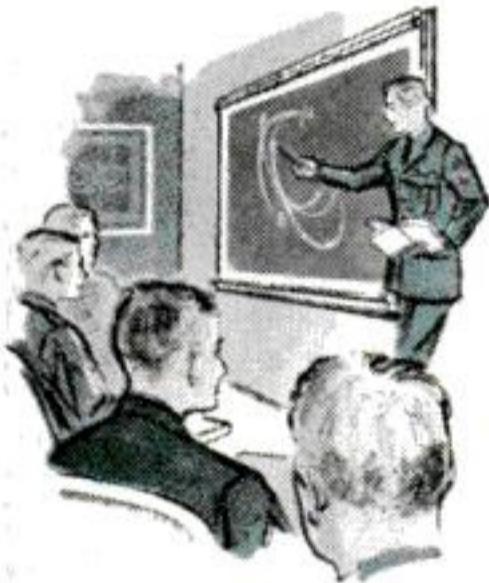
© A. T. Co.

Product of The American Tobacco Company - "Tobacco is our middle name"

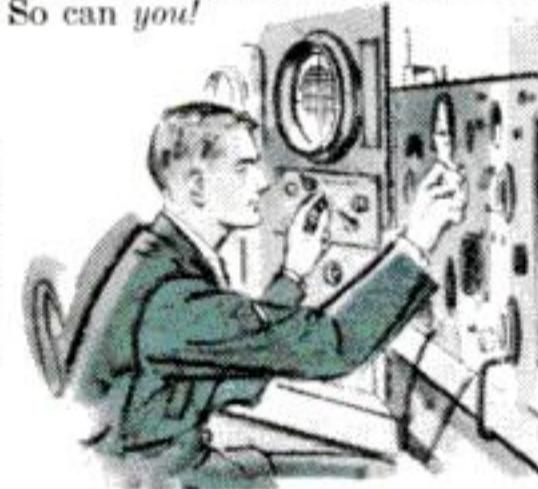
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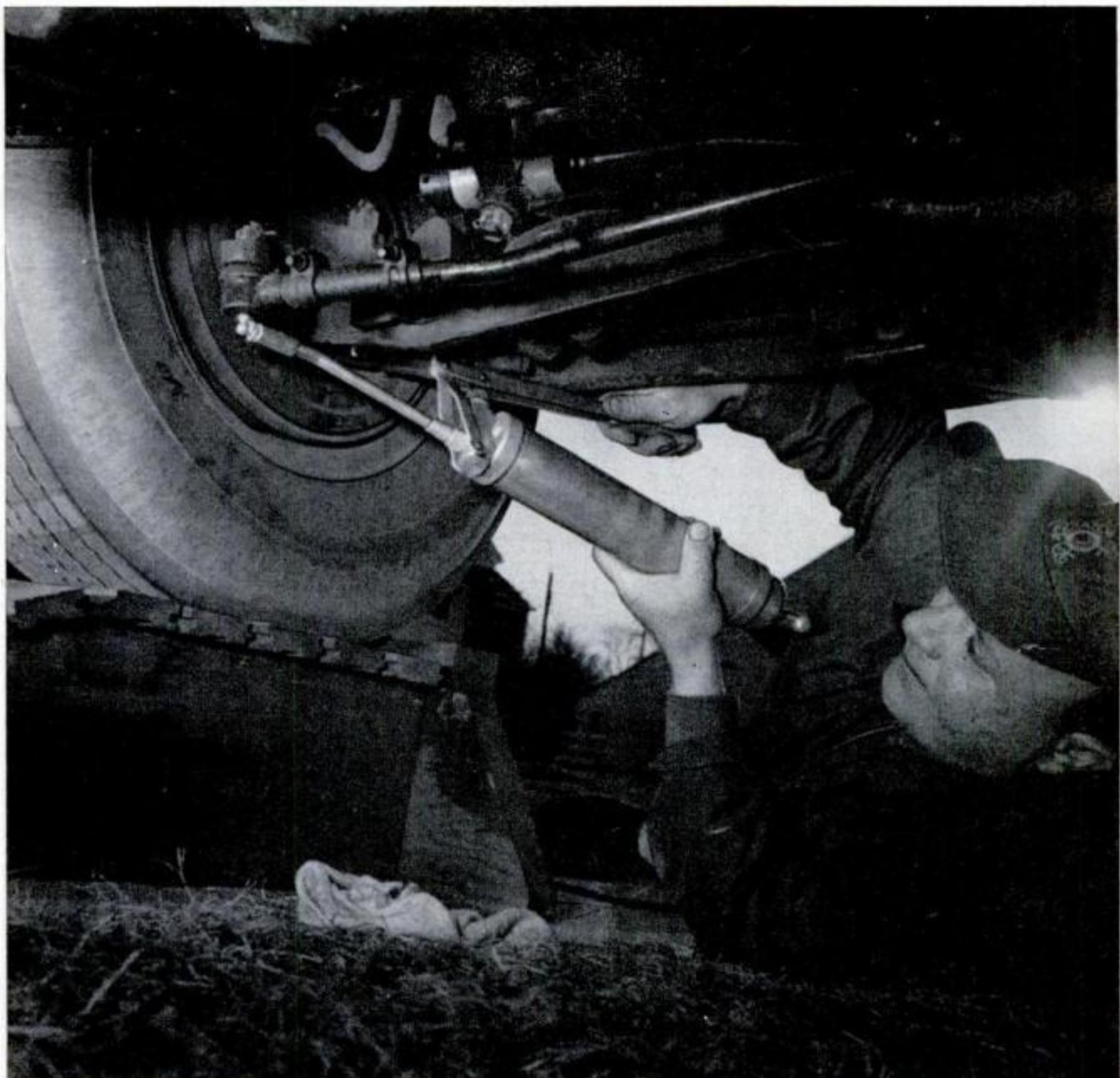
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*** HERE'S HOW** *your choice is guaranteed before you enlist: Just tell your Army recruiter which outfit you want to join—or where you'd like to serve. He'll check to make sure there's a spot open in the outfit or area you want. If there is, you get it. If not, there's no obligation.*

**Plan your education—get CHOICE,
not chance, in Today's Army**



Why Home Greasing Pays Off

***It's a job that can be done
in minutes with a three-dollar
gun that soon pays for itself***

By Herbert R. Pfister

PHOTOS BY W. W. MORRIS

IT COSTS me less than a dime to grease my car—a modest saving of \$1.40 each time I do it. But that's not the real reason why I'm a do-it-myself

grease monkey; I feel I'm saving my car. I've lavished about 25 ten-cent grease jobs on it, and after two years, it rides better than ever.

Actually, I was shocked into greasing my new car at home when I noticed a hurried lubrication man forcing grease into another car's kingpins without even wiping the dust off the fittings. The damage caused by this too-common practice isn't immediately evident, but you can imagine what that grit does when the



A PAIR OF RAMPS will give you all the headroom you need to comfortably swing the grease gun against any fitting. Lacking ramps, you can



jack up the car (right) and place 6"-by-6" blocks under the front wheels. Either way, be sure the parking brakes are firmly set.

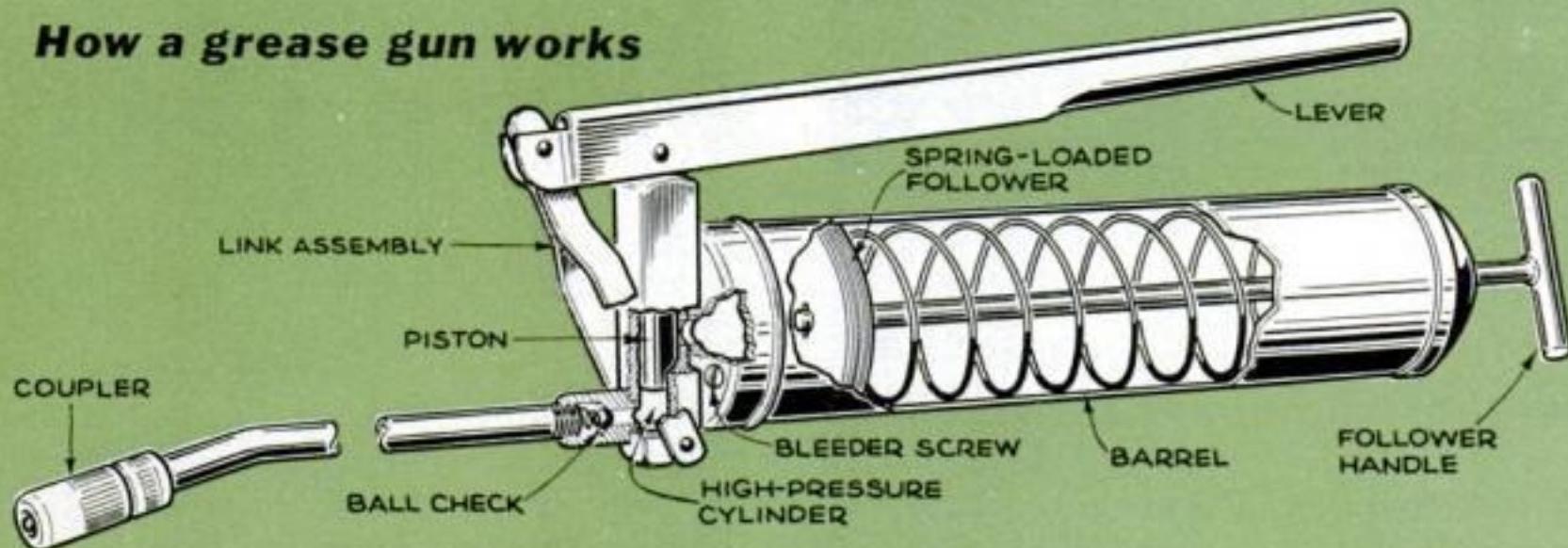
How to load the gun and bleed out air



BEFORE LOADING, pull the follower handle all the way out and lock it with a twist. Grease can be spooned into the gun with a clean wooden paddle (left), or the barrel can be pushed into

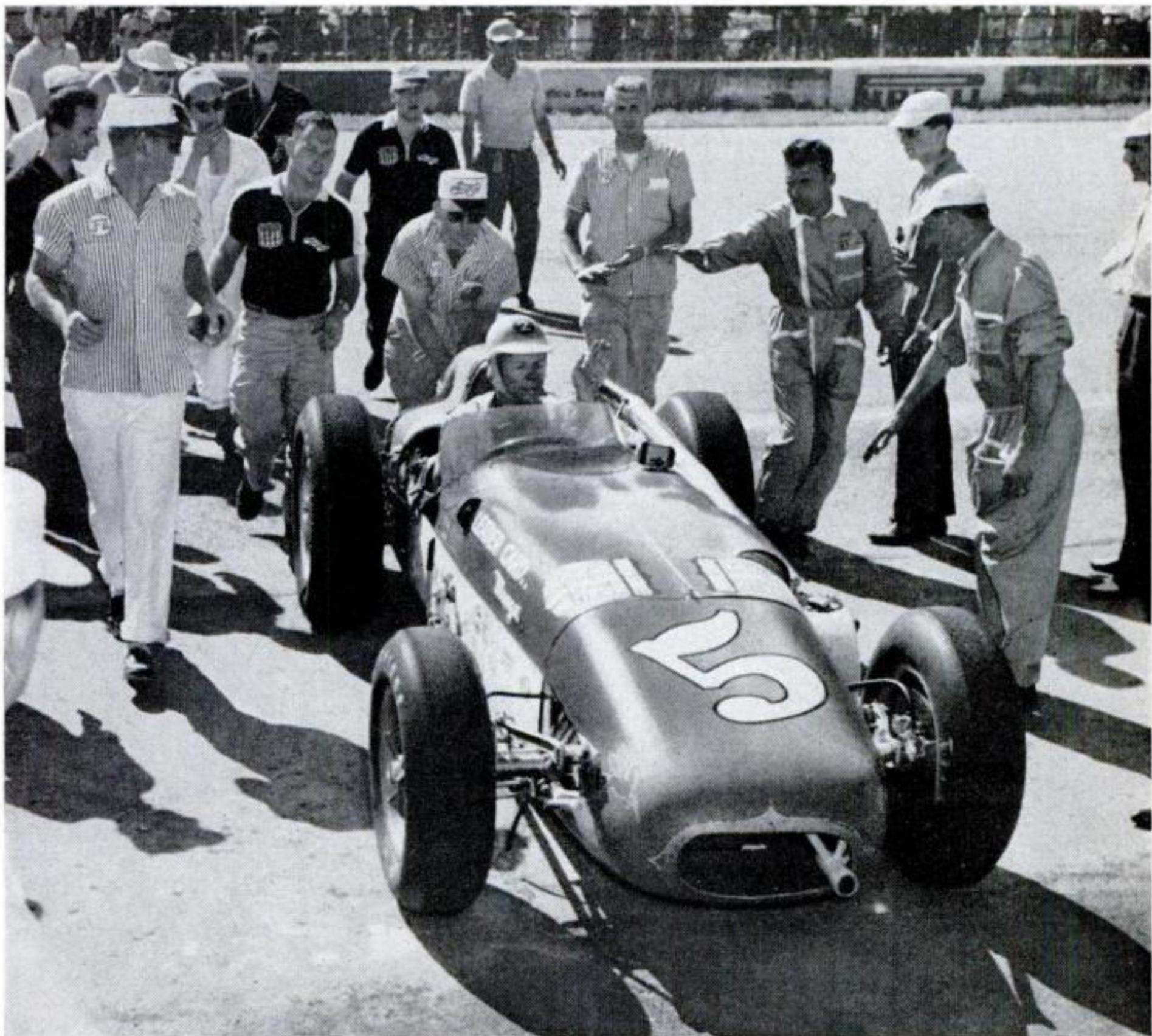
the grease and withdrawn filled. Screw the head back on (center), unlock the follower handle, and loosen the bleeder screw on the head (right) to release trapped air from the barrel.

How a grease gun works



MOVE THE HAND LEVER outward from the gun barrel and grease enters the high-pressure cylinder through a small port in the head of the barrel. Forcing the lever against the barrel moves the small discharge piston

with tremendous mechanical advantage, forcing grease into the coupling at near 10,000-lb. pressure. The spring-loaded follower plunger keeps pushing the grease to the piston end until it's exhausted.



Jim Rathmann at Monza, Italy, after winning the world's fastest race (average speed 166.788 mph)

Q. Why do *9 out of 10* racing car winners use Champion spark plugs?

A. Because Champions deliver the consistent performance racing cars need to *win!* Put a set of new Champions in your car every 10,000 miles. You'll get an immediate boost in power, and save gas, too!



CHAMPION



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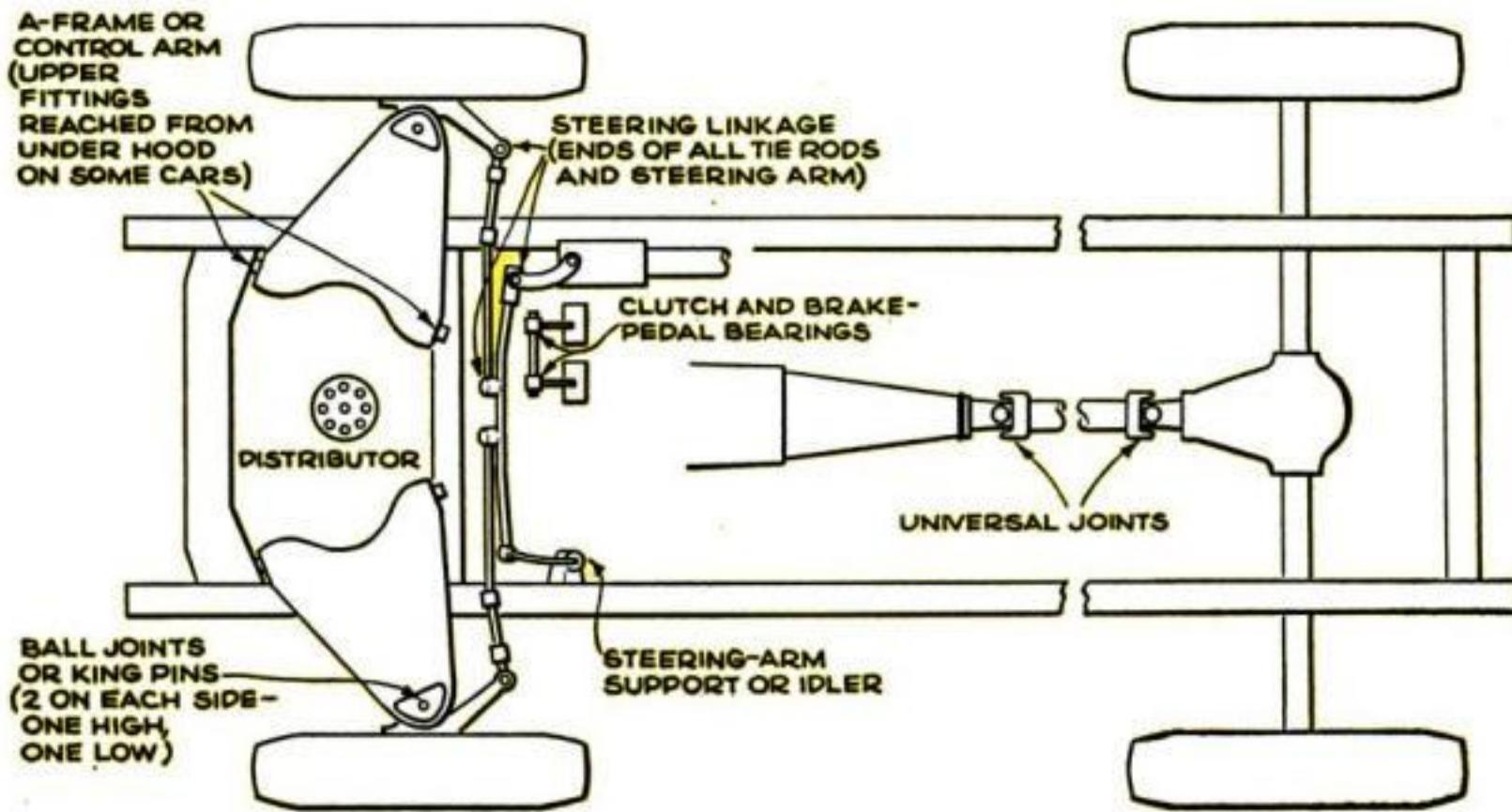
CHAMPION

How to handle a grease gun efficiently



WIPE THE FITTINGS CLEAN before greasing them. Best way is to thoroughly clean all fittings at once, while both hands are free. Press the coupler of the gun firmly on each one. You'll feel the coupler jaws snap over the head of

the fitting. Hard-to-reach fittings pose no problem to a flexible coupling (right) that snakes its way through and around obstacles. Type shown has flexible joints. You can buy a flexible hose coupling, too, to fit your gun.



LOCATION OF FITTINGS varies with the make of car. Look for them where A frames pivot above and below the chassis, on the ball joints or kingpins, on clutch and brake-pedal shafts, on

or near the universal joints, and at the side of the distributor. To be sure you find all the fittings, consult the lube section of the owner's manual that came with the car.

grease carries it into the car's bearings.

Another reason: Car manufacturers specify chassis lubrication every 1,000 or 2,000 miles, yet factory-installed push-button lube systems come with instructions to push the button *every 50 miles*.

When to lube? I bridge that wide gap between 50- and 1,000-mile intervals by greasing once a month. This works out to an average of 400 to 500 miles between lubes, and the grease gun is always handy to put in an extra shot or two if the mileage should go higher some month, or if much driving has been done in heavy rain, snow or slush.

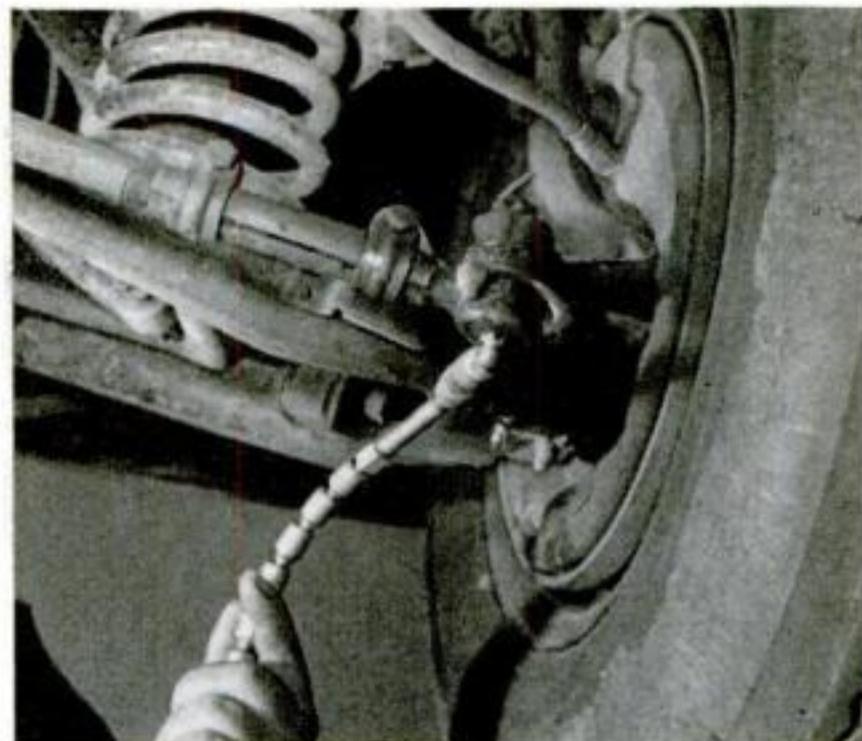
I find, too, that waiting your turn on a busy Saturday or leaving the car at the service station while you waste time on foot often means putting off an overdue grease job. It's much easier and a lot more convenient to go out to the garage and leisurely pump grease into a few fittings with a hand gun.

Lots of benefits. Easy steering, smooth riding and long life for the front suspension result from frequent greasing, and the difference is more apparent on late-model cars with ball-joint suspension. These ball joints support the car's weight and serve as the pivots for the steering system. Every bump in the road or turn of the steering wheel creates motion in the ball joints, and motion breaks down the cushion of grease.

Vibration caused by front wheels even slightly out of balance can pound the lubricant out of ball joints in a couple of hundred miles of driving. Rain and snow hasten lube breakdown as water finds its way into the joints and washes out the grease. It's small wonder so many cars roll off the grease rack on the widely advertised "cloud" and return 1,000 miles later creaking and groaning in their most vulnerable area—the front end.

What equipment do you need? Very little. A lever-type grease gun and a couple of pounds of chassis grease will set you up. Most guns take a pound of grease at one filling, so a five-pound can is most economical. While you're at it, you might even cultivate the habit of changing your oil and filter cartridge. The additional money saved will make home servicing more worthwhile and, if you have a tire pump, you'll be independent of the service station except for buying gas.

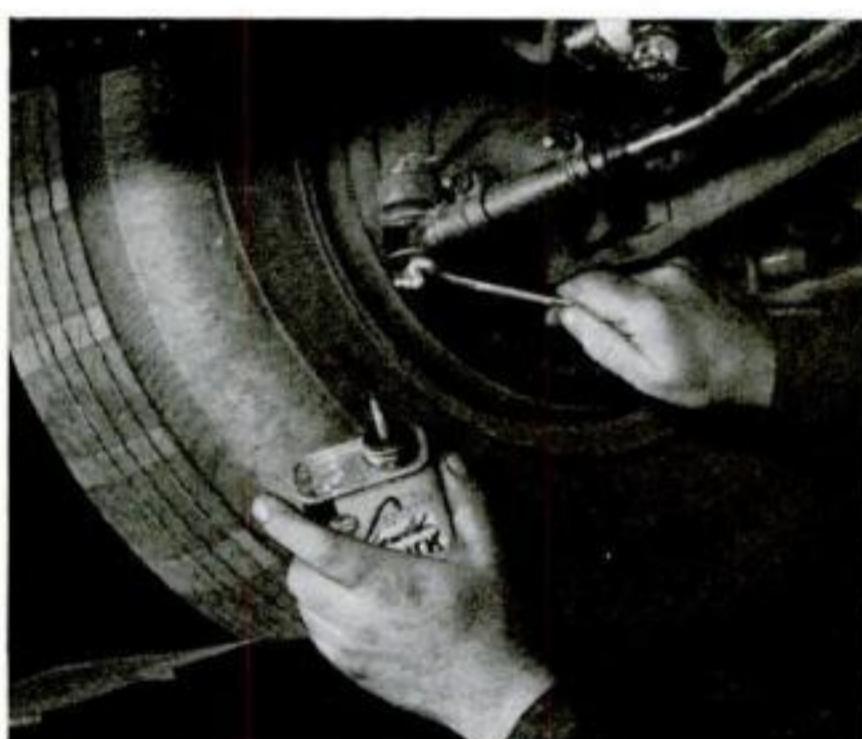
END



PUMP THE LEVER until grease oozes out around the sides of the bearing. Some spots require only one or two shots, others six or eight.



IF GREASE OOZES OUT around the fitting, the coupler is not on straight. Press harder and shift the gun to line it up with the fitting.



IF THE GUN IS HARD TO PUMP, the fitting may be clogged or bent. Have someone rock the car while you try again, or remove the fitting and squirt penetrating oil into the bearing and the fitting to dissolve hardened grease.

Gus Reveals a Trade Secret



The sound of impatient honking came from the shop. "Thanks for the warning," Gus told Stan.

By Martin Bunn

THE man behind the wheel of the elderly sedan honked his horn as he drove into the Model Garage. Gus Wilson, walking over to where the car had stopped just inside the doorway, saw his young assistant, Stan Hicks, frantically beckoning to him from behind the glass office partition.

"Be with you in a minute," he called to the customer and joined Stan.

"Turn that job down, Gus. It's loaded."

"Loaded?" Gus asked.

"Yeah," Stan explained. "Bill Dart down at the City Garage has been stuck with it for more than a week. The guy driving it is Dart's brother-in-law from Belleville, Al Pierce."

"I get it," Gus said, rubbing his chin. Bill Dart, a young mechanic who had recently taken over the rival garage, was all out to cut into Gus's business.

"Sure, Gus. You fix it, Bill Dart takes



the credit. You fail, and he'll spread the word one way or another."

"What tipped you off, Stan?"

"Oh, I get around. Dart sold that car to Tom Morgan with a guarantee. Now some trouble has developed that he can't fix. He's stalling Morgan off, saying he's too busy to get at it. Won't admit being stumped as a mechanic."

The sound of impatient honking came from the shop. "Thanks for the warning," Gus said.

As he went into the shop, the man sidled out of the sedan and introduced himself. "Just came in for a tuneup before leaving on a trip."

"Okay, Mr. Pierce," Gus said, lifting the hood. "Start the engine."

The garageman listened to a smooth idle. He reached over and slowly advanced the throttle at the carburetor. The engine picked up nicely, then roughened, shook on its mounts, getting rougher as speed increased. Either the high-speed

jet was fouled, Gus figured, or the carburetor float level was set too low, so the motor starved for gas at higher speeds. He began to pull the carburetor.

"Spotted something right away, eh?" Pierce remarked.

Gus detected a note of sarcasm in the man's voice, and as he took the carburetor down on the bench he realized that Bill Dart had undoubtedly already gone over it several times. Pierce knew that Gus was wasting his time. And as it

rage down the street," Gus said patiently.

Pierce reacted as Gus had expected. "No offense meant," he said hurriedly. "Take your time. I'm in no hurry."

Now Gus knew that Stan Hicks had been right and that he *had* to find the trouble. Otherwise the rival garageman's brother-in-law was all set to spark snide rumors about the Model Garage. Gus wasn't worried about that. He just refused to let himself be flummoxed by a couple of smart alecks.

Just then Stan Hicks, who had been watching from a corner of the shop, trundled up the test machine. "Thought you might be needing this, Gus," he said, giving his boss an I-told-you-so look.

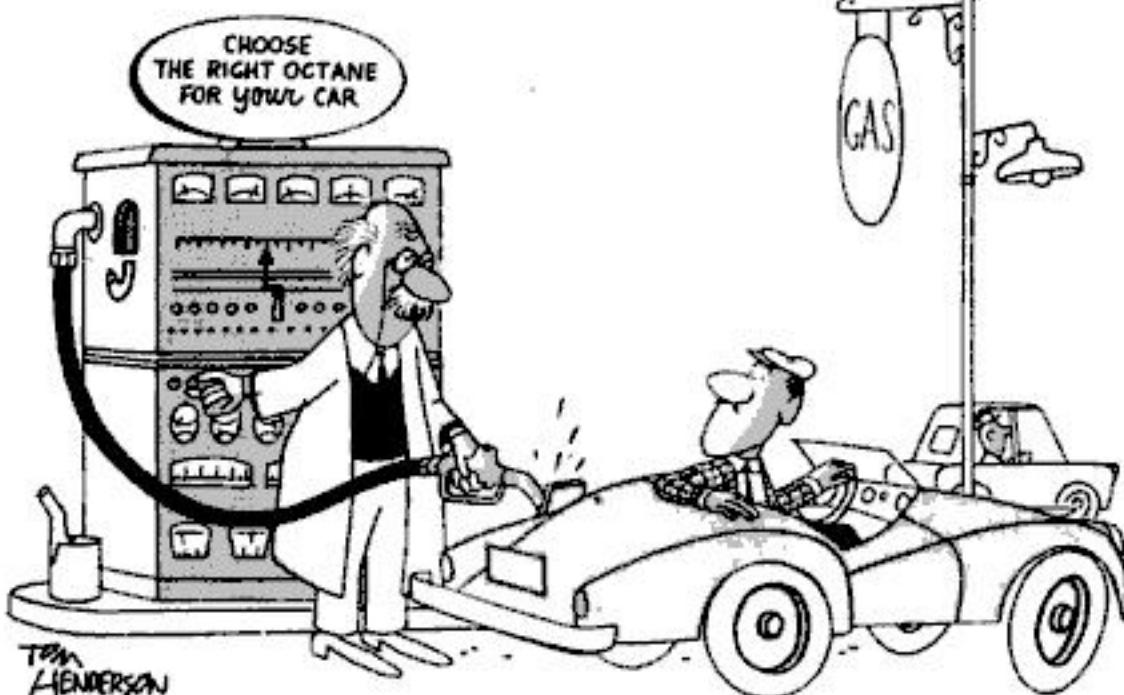
"Thanks," Gus said, turning his attention to the ignition system. He checked the timing, points, distributor cap; ran a test on the coil and condenser. Nothing wrong. In each place there were indications that Bill Dart had been

working there before him. Gus removed the spark plugs, cleaned them, ran a breakdown test. Glancing up, he caught Pierce grinning.

"Let's take her for a run," Gus said.

Out on the street he toolled the car through traffic. It ran as smoothly as a jeweled railroad watch. On the road, Gus stepped on the accelerator. The car picked up nicely, then roughened, slowed, missed, threatened to quit entirely with a hollow sound that seemed to signal gas starvation.

AS HE drove, his companion silent at his side, Gus recalled several cases where the hollow sound had signaled ignition trouble instead of lack of gas. But there was nothing wrong with the ignition system of the car. Or was there? His eyes on the ammeter, he picked up speed. Just as the car began to run rough there was a flickering of the ammeter needle. With a clean ignition system it shouldn't



turned out, he was. The float level was set to factory specifications and the high-speed jet was clean as a whistle.

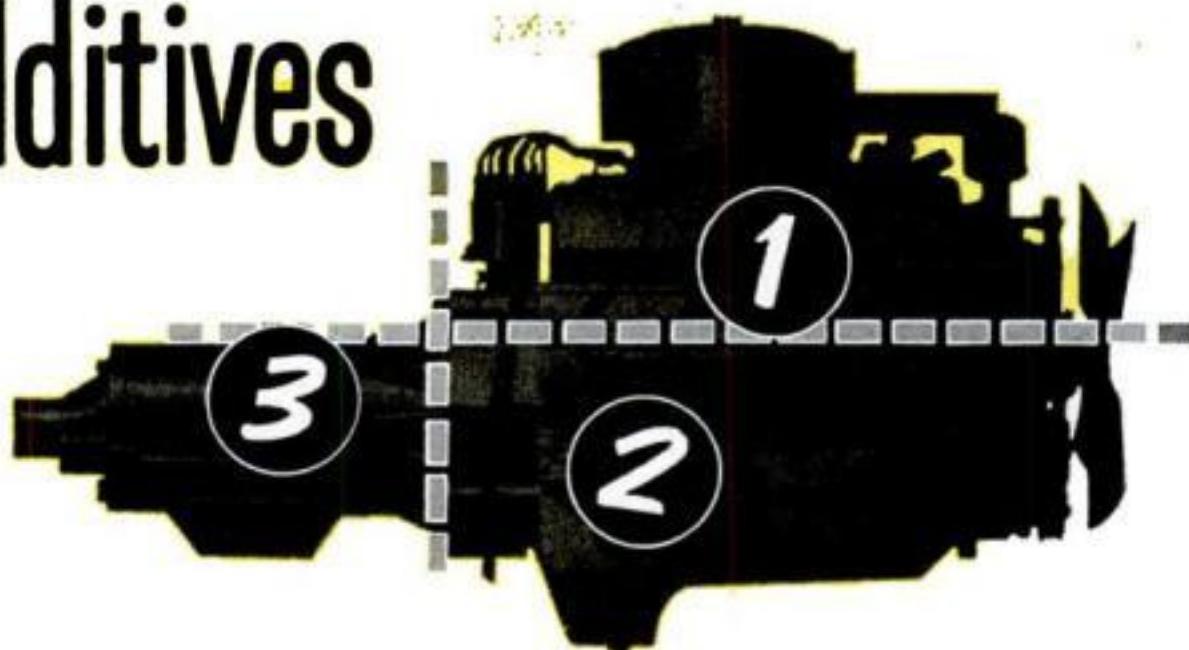
"Sure you can put it together again?" said Pierce as Gus began to reassemble the carburetor. "Good as it was, I mean."

GUS ignored him. Then, still working on the theory that the car was starving for gas at high speeds, he ran a test on the fuel pump, checked hoses and gas lines for loose connections, brakes, air leaks, hose breakdown, flattening or obstruction. He checked the gas-tank air vent, then tightened the manifold studs, went over the gasket for leaks, ran a vacuum test. Everything seemed to be in order. He started the car, and again it roughed with the engine speeding.

"Have fun," Pierce said smugly, crossing his arms over his chest. "I drive the car in here, running fine, and ask for a simple tuneup. Now listen to it."

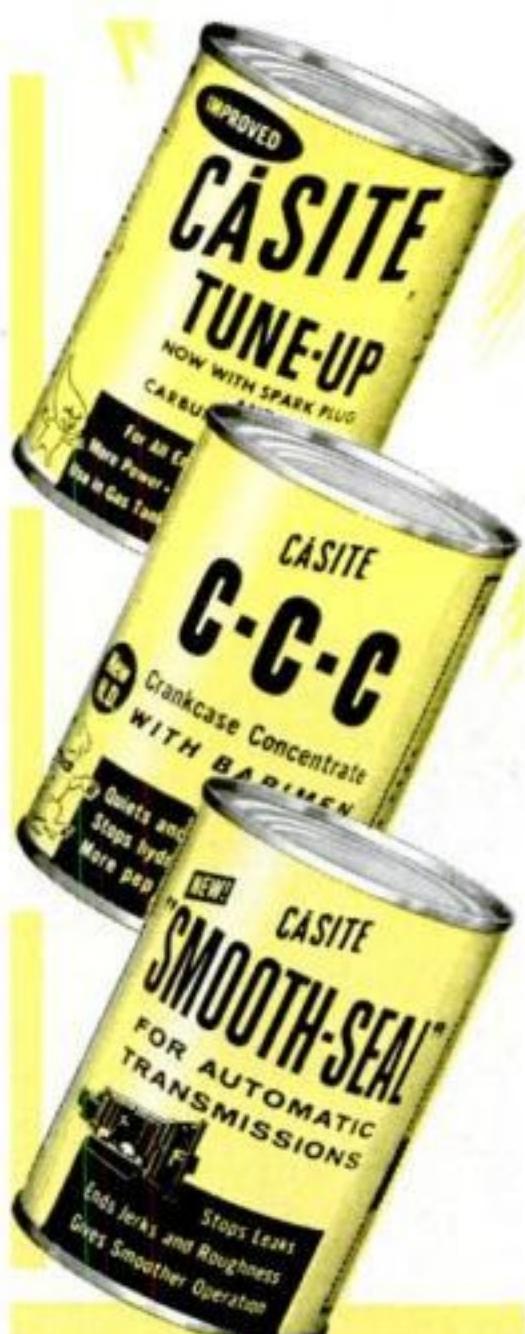
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have occurred. Still, the flicker could have been caused by a slight short somewhere else in the car under speed pickup vibration, or even by a bouncing generator brush.

Back at the Model Garage, Gus stuck his head under the hood again. He spotted a new gasket under a cylinder head that also seemed to be new. "Had a new cylinder head put in recently, I see."

"Yeah," Pierce said. "It had a weld and I wouldn't buy until the used-car dealer installed a new head."

With this clue, Gus was off on a new tack. As he inspected the new head, it seemed that the coil mount was a bit farther from the distributor than the original had been. If so, the primary wire from the coil to distributor might be a bit short.

He started the engine. As it speeded up, he noticed that the automatic spark advance caused the distributor to rotate, increasing the distance between the coil and where the wire was attached, pulling it taut. "Could be," Gus said to himself, picturing the wire tightening and loosening with every change of speed. With his back to Pierce, he removed the wire and replaced it with a jumper wire.

"Okay, Mr. Pierce, let's take another drive."

THIS time the car accelerated with velvet smoothness from 10 miles an hour to 60. Gus turned around, taking silent satisfaction from the surprised look on the face of the man next to him. When he drove into the Model Garage and got out, Pierce slipped behind the wheel, taking out his wallet.

"How much do I owe you?"

"Not so fast," Gus said, reaching over and turning off the ignition. "You tell that brother-in-law of yours, Bill Dart, that I'll deliver this car to him personally—and the bill, too."

The man's face reddened. He started

to protest, thought better of it, and got out. "Well," he said, shrugged his shoulders, "it's no skin off my back. I'll tell him, all right."

When Pierce was gone, Gus called Stan over. Together they examined the old piece of wire, cutting open the insulation. As Gus had suspected, all but a few of the copper strands inside were broken. He explained to his assistant:

"You see, at slow engine speed, with the automatic spark retarded, the broken ends of the wire came together so that it delivered normal voltage. But at high speeds, with the ends pulled apart it wasn't capable of carrying full voltage to the ignition points."

Gus replaced the jumper wire in the car with a new wire having the same colors as the old one. He rubbed it with dirt and grease to hide its newness.

Stan chuckled. "Bill Dart will never know what was wrong."

Gus pulled out his pipe and began filling it. "Well, Stan, that was my idea,

but I've changed my mind." He rubbed the dirt and grease off the new wire. "Young fellows like Bill Dart, just starting, can use all the tips they can get."

"Wait a minute, Boss," Stan objected. "This 'turning the other cheek' can go too far. Bill Dart will take all the credit and Morgan won't even know . . ."

"I'm not so sure about that, Stan."

"What makes you think so?"

"Well, a couple of things. For one, as we drove through town just now Tom Morgan was coming out of the Post Office. I'm sure he recognized the car. If he can add two and two . . ." Gus struck a match and held it to the bowl of his pipe.

Stan waited. Then: "You said a couple of things?"

"Yes, reckon I did," Gus said, puffing a cloud of smoke. "I was thinking of you, Stan. I've never known you to hide our Model Garage light under a bushel." END

Next Month: Gus turns private eye.

"I COOLED in figuring my gear train," said Sam, showing a friend the works he had built for a grandfather clock. "It would run perfectly if the ratchet wheel worked by the escapement had $26\frac{1}{2}$ teeth instead of 26, as it has now. But how can you make half a tooth?"

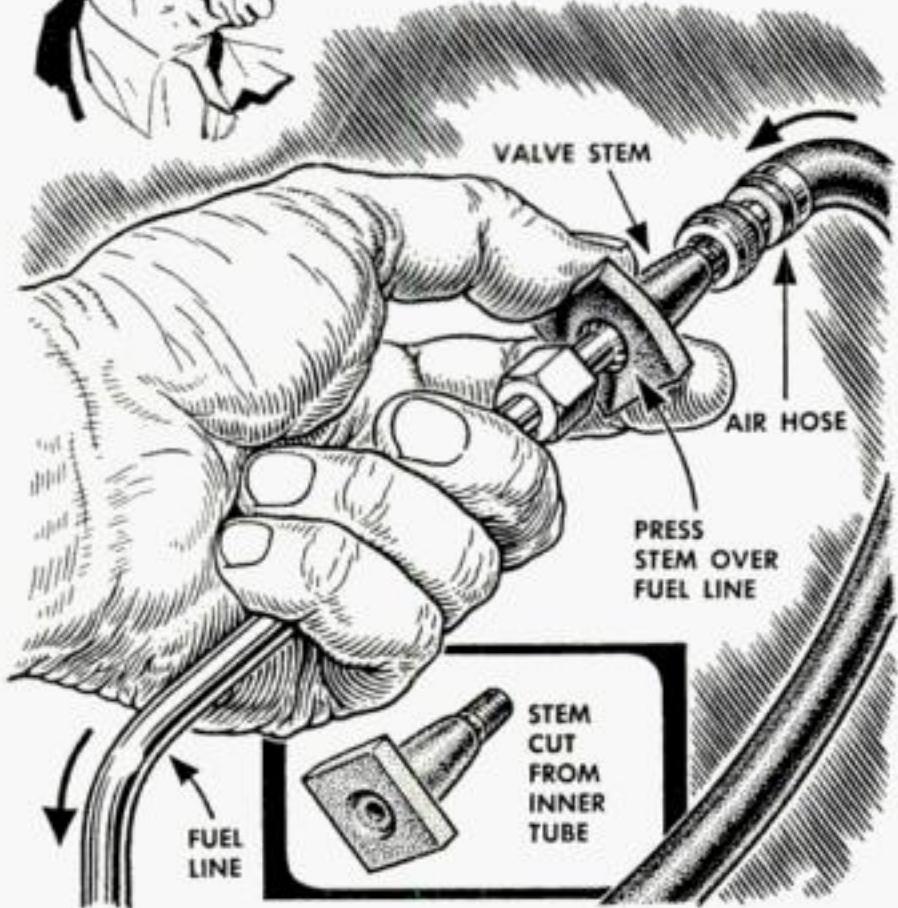
"You can't," said his friend. "But you can make a ratchet wheel that will act as if it had half a tooth."

...How Come?

ANSWER: Sam could make a new wheel with 53 teeth, and after the escapement to trip two teeth at a time instead of one, giving the effect of a ratchet wheel with $26\frac{1}{2}$ teeth.



Hints from the Model Garage



A clogged fuel line can be blown clear with a service-station air hose if you press an old tire valve stem over the tubing and apply the air hose to the stem. This puts full pressure in the line, so don't blow into the carb or fuel pump.



You can quickly locate a nail or a sliver of metal inside a tire casing by wiping the casing with a discarded silk or nylon stocking. The filmy fabric will snag on the tiniest irregularity in the normally smooth rubber, signaling its location.

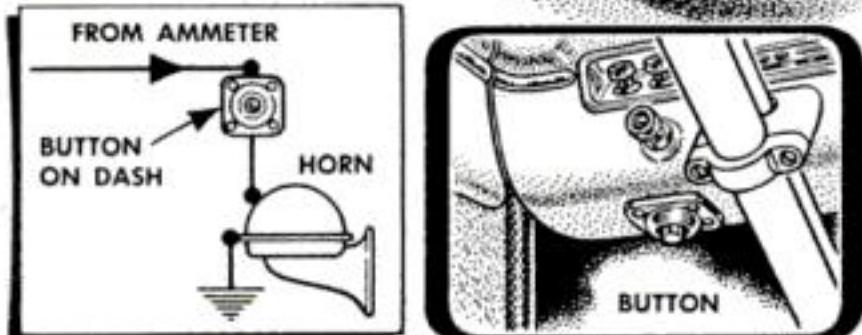
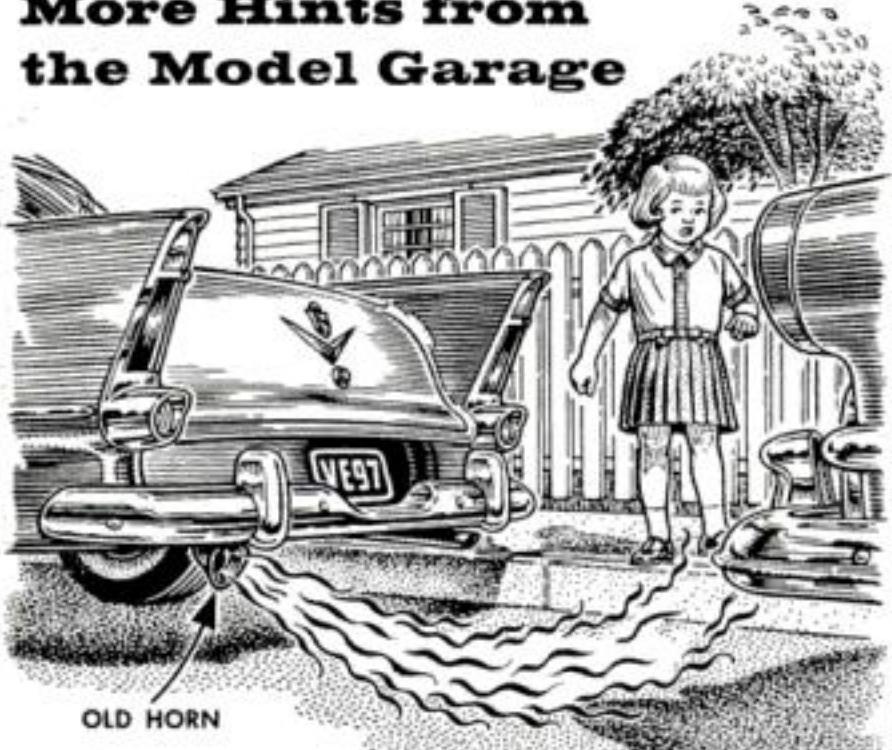


Wheel covers make fine markers on the roadside if their inside surface is covered with reflective tape. The disks are always handy and can be waved by hand or braced by a stick in the valve-stem hole to glow in oncoming headlights.

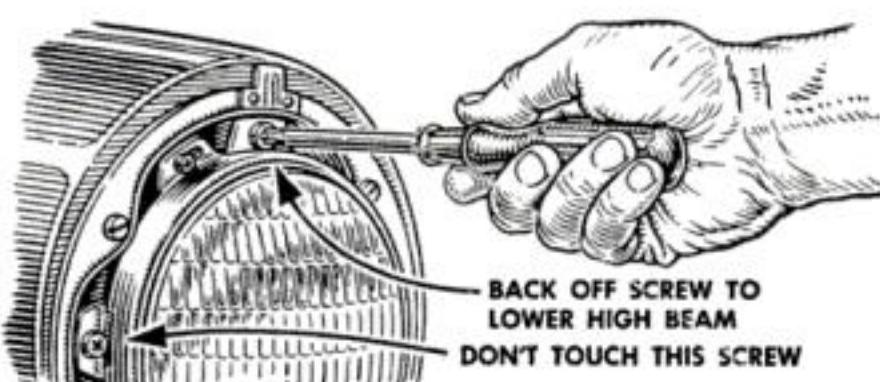


For out-of-the-way storage of cans and small parts in the garage, bridge the empty spaces between wall studs with a number of 1" shelves about $3\frac{5}{8}$ " wide. Cleats can be nailed to the sides of the studs to support the shelves.

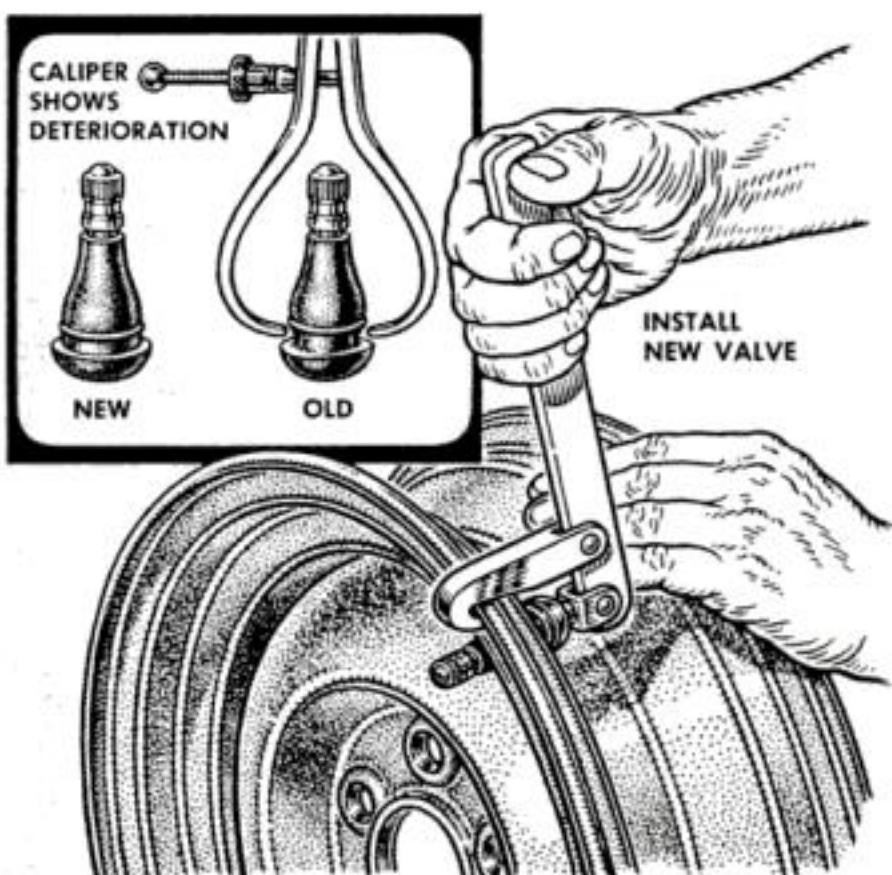
More Hints from the Model Garage



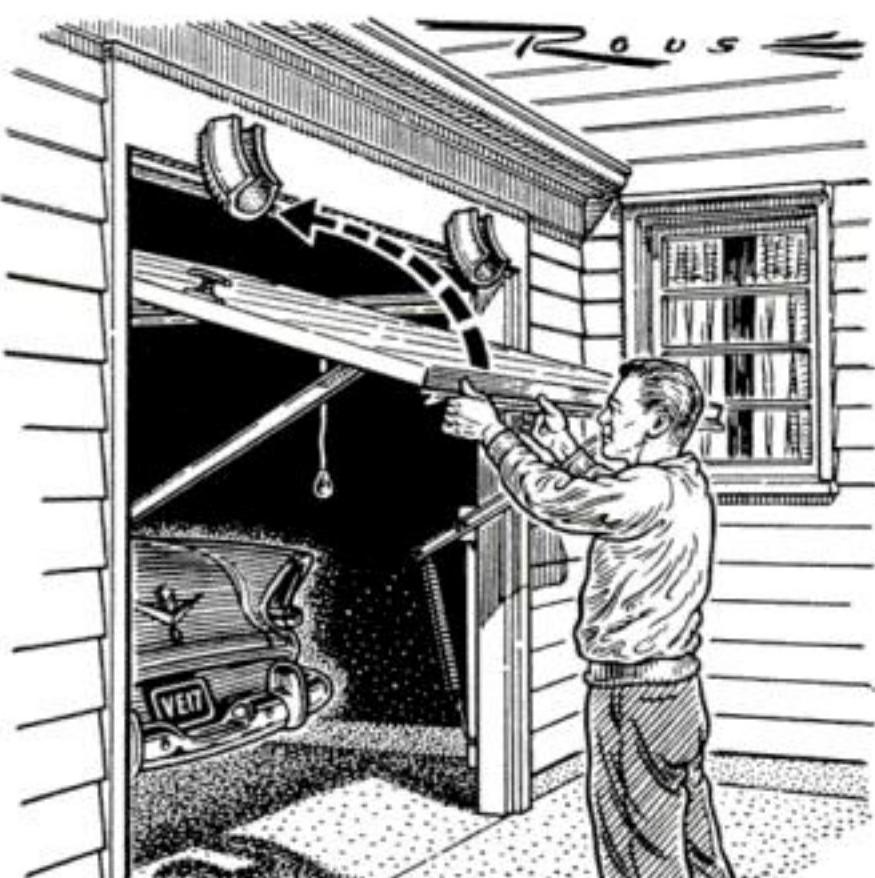
Ever blow your horn in vain to warn someone behind you that you're backing up? A junkyard horn bolted to the rear bumper bracket will blow in the right direction when you press a button on the dash. No horn relay is needed.



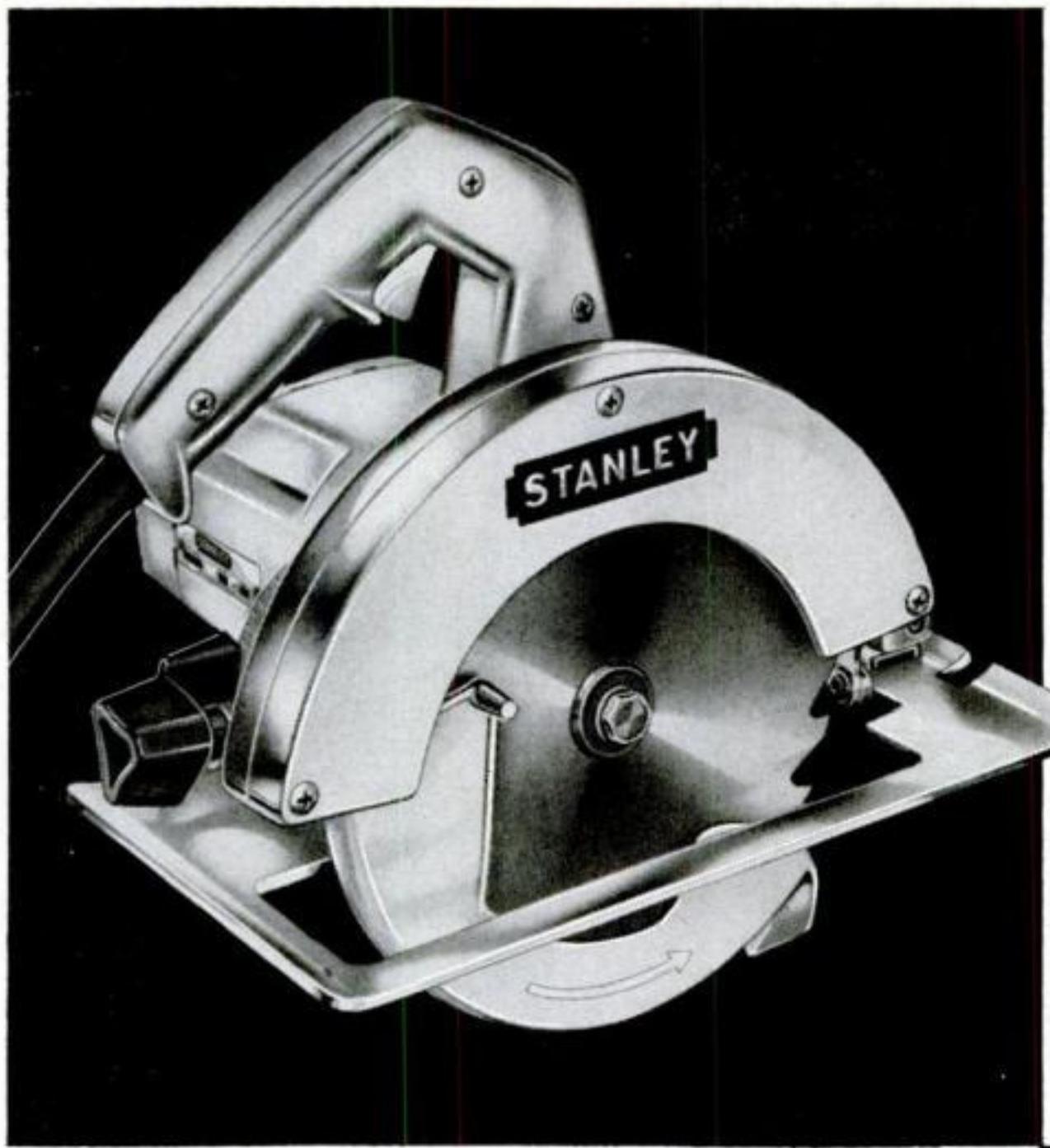
When hauling a trailer or carrying a load that makes the car tail heavy, aim the headlights down a bit to keep them on the road. Back off the vertical-adjustment screw exactly one turn so you can easily raise the beams for normal loading.



When you buy new tubeless tires, have the dealer snap in new valves as well. The old valves may have given good service through the life of the original tires, but age has taken the elasticity out of the rubber and weakened its seal on the rim.



An overhead door may jump the track when small children raise it and let it fly up against the stops. To prevent this, above the doorway nail two sections cut from an old tire. This will snub the door before the rollers hit the stops.



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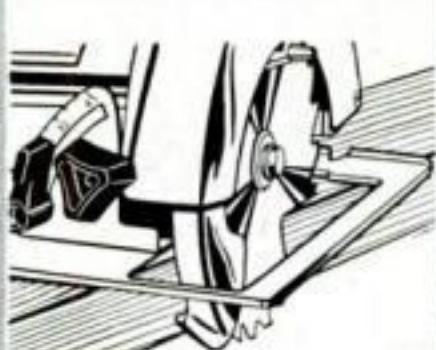
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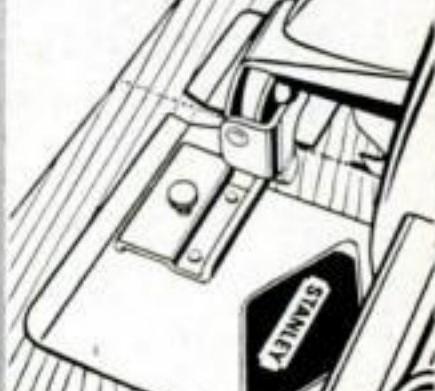
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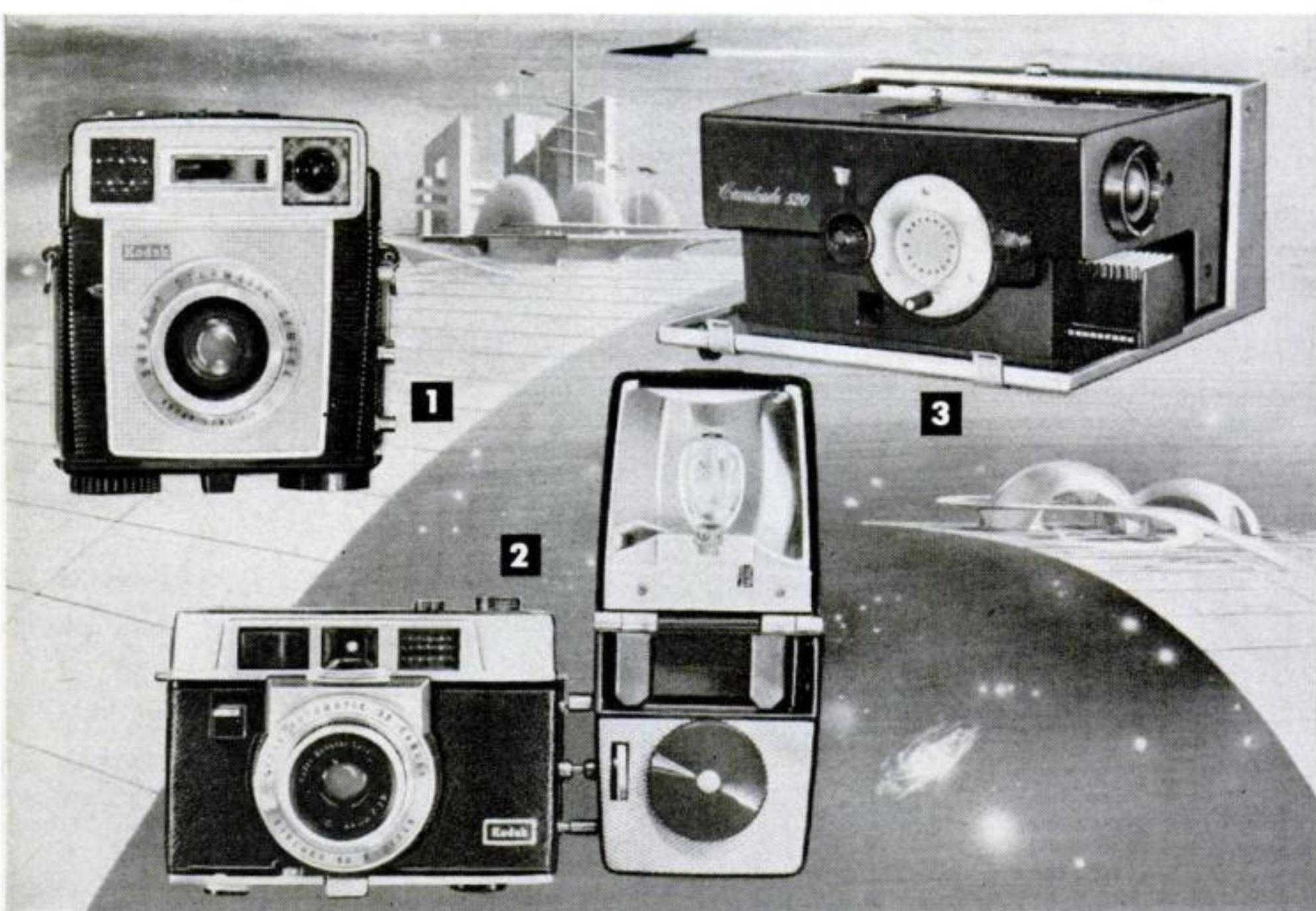
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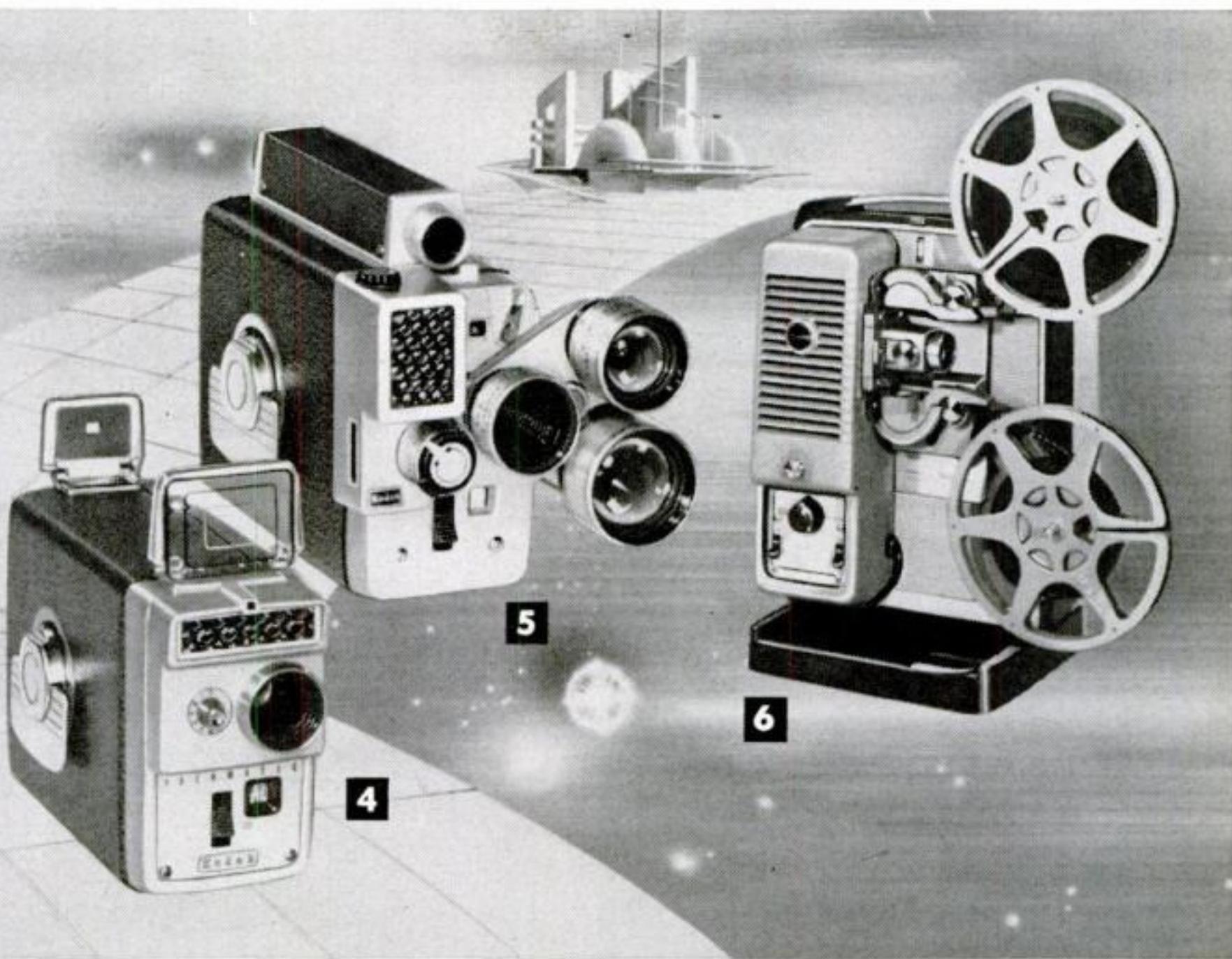
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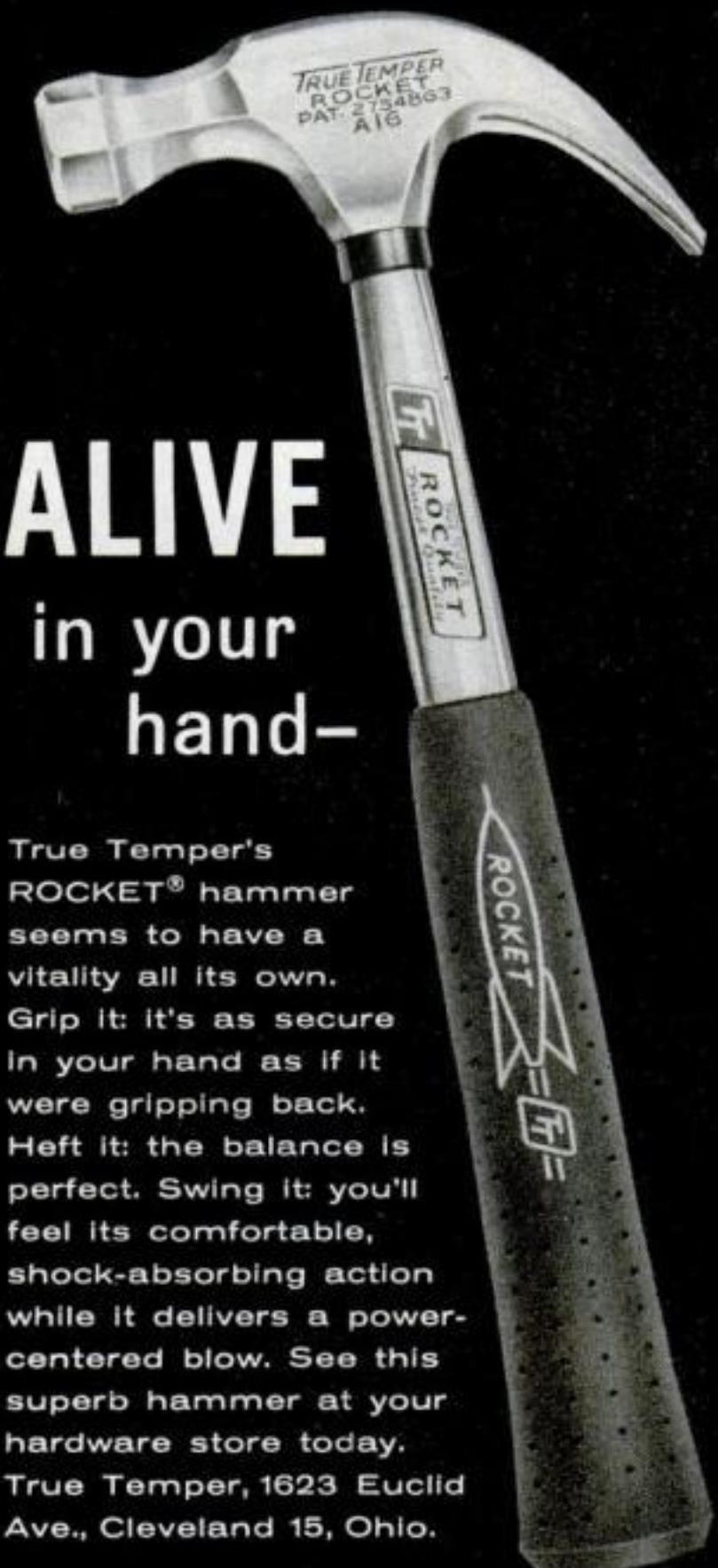
Rochester 4, N.Y.

4. NEW Brownie Automatic Movie Camera, f/2.3, with electric eye that automatically sets the lens to every changing light condition—indoors or out. You get beautiful 8mm movies every time. Lowest priced fully automatic movie camera ever. Only \$74.50

5. NEW 8mm Kodak Cine Automatic Turret Camera, f/1.9, has electric eye that continually adjusts lens to any light, yet you can lock the lens opening at any setting. Takes regular, wide-angle, telephoto scenes. Only \$124.50

6. NEW Automatic Kodak Cine Showtime Projector, Model A20, threads itself! Simply slip film end into slot. It feeds through projector and onto take-up reel automatically! Fast f/1.6 lens, high-lumen lamp for brilliant 8mm shows. 400-foot reel capacity. Only \$137.50

Kodak
TRADEMARK



ALIVE in your hand-

True Temper's ROCKET® hammer seems to have a vitality all its own. Grip it: it's as secure in your hand as if it were gripping back. Heft it: the balance is perfect. Swing it: you'll feel its comfortable, shock-absorbing action while it delivers a power-centered blow. See this superb hammer at your hardware store today.

True Temper, 1623 Euclid Ave., Cleveland 15, Ohio.



Hatchet, belt axe and ball peins, too, in famous True Temper ROCKET design that has proved its worth in the hands of so many proud users. Ask a carpenter!

TRUE TEMPER
THE RIGHT TOOL FOR THE RIGHT JOB

Why You Can't Fool the Radar Cops

[Continued from page 70]

is calibrated to read the measurement in miles per hour.

No way to beat the rap? Well, you'd have to blanket the radar with a signal that would make the difference measurement come out erratic. This can be done with another radar transmitter, if you can tune it right. That's difficult, the equipment is very expensive, and besides, you'd have the Federal Communications Commission after you for operating an illegal radio transmitter.

Some truckers think that their two-way radio equipment will jam the cops' radar. At least, they make a habit of calling back to their terminals whenever passing a radar stakeout. But it's unlikely that truck radio could interfere with the radar frequencies (the cops routinely use *their* radios, which are similar, while radar-clocking speeders).

The only other possibility is to create a false target for the radar, one that's bigger than your car and moving faster. (Smaller or slower doesn't help because the radar automatically selects the biggest and fastest object. Tricky, huh?)

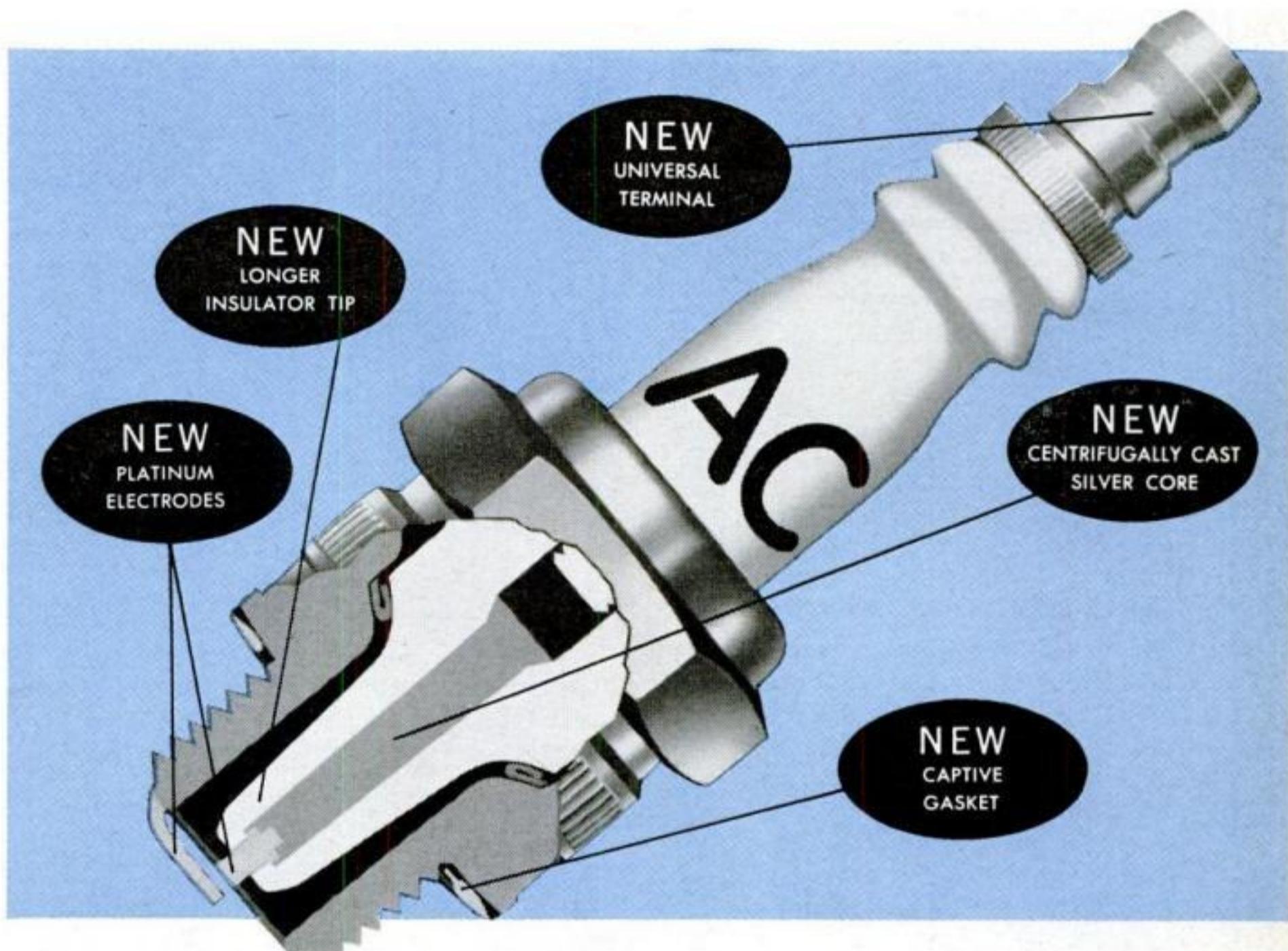
If you covered your car with chains, and rigged them to jingle—in the direction you're going—very fast, you'd have it made.

Decking out your car, bumper-to-bumper, with fluorescent lights (AC-fed) would also play hob with the radar meter. The stream of ionized gas that generates the light inside the fluorescent tube reflects radar waves. And since it flickers on and off very rapidly, it would seem to the radar to be moving fast.

Just a few chains or a few fluorescents do nothing. You'd need a big, big target (also the services of an expensively sharp lawyer to explain what in sam hill you were doing driving such a contraption on a public highway).

How about a radar detector—a gadget to warn you in advance that the cops' electronic eye was watching? That you can make without violating any laws or spending a fortune (less than \$40). It's a receiver, sensitive to radar wave lengths, that hooks onto your car radio and whistles when you hit the beam. (Detailed building plans were published in the Jan. '58 issue of the ham-radio magazine *CQ*.) But the best you get is last-

OUTSTANDING NEWS FOR POWER BOATERS!



NEW AC PLATINUM ELECTRODE SPARK PLUGS!

Proved in planes, now available for marine applications! If you want the highest performance from your boat motor you'll want AC platinum electrode Spark Plugs!

New platinum electrodes deliver peak performance throughout longer service life! Their finer points ensure powerful sparking even under sub-normal conditions of low voltage or weak coils . . . higher heat conduction prevents pre-ignition . . . non-corrosive properties provide more permanent gapping . . . smaller electrodes assure better scavenging action. New centrifugally cast silver core permits longer insulator tips because of more rapid heat dissipation—and greater anti-fouling characteristics. AC's platinum electrode Spark Plugs bring new standards of performance to extreme engine applications. They're rustproofed, too. Get platinum electrode ACs!

AC SPARK PLUG  THE ELECTRONICS DIVISION OF GENERAL MOTORS



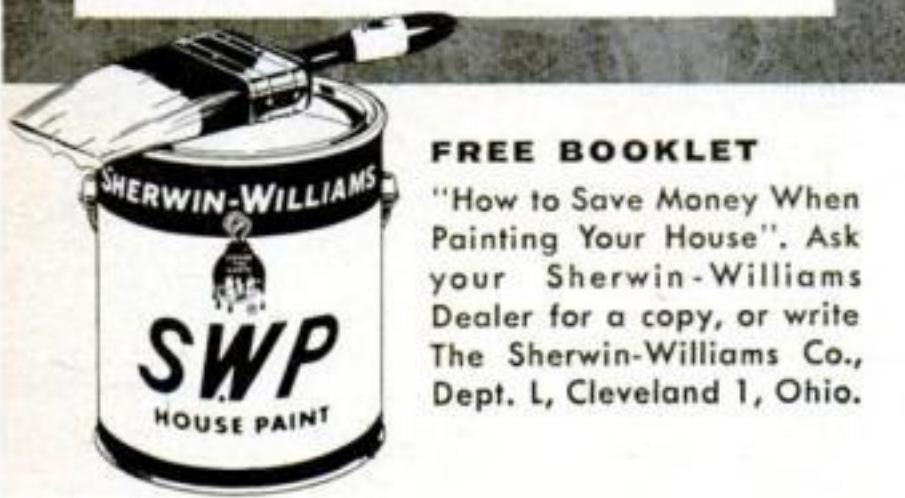
PLATINUM ELECTRODE
SPARK PLUGS



PAINTING YOUR HOUSE THIS YEAR?

For greatest economy when painting your house, use world-famous SWP House Paint. The super-durability of SWP will result in a paint job that will give extra years of beauty and protection. SWP's longer life can save you hundreds of dollars in repainting costs over the years.

Insist on SWP . . . the house paint that protects more homes in America than any other brand.



FREE BOOKLET

"How to Save Money When Painting Your House". Ask your Sherwin-Williams Dealer for a copy, or write The Sherwin-Williams Co., Dept. L, Cleveland 1, Ohio.

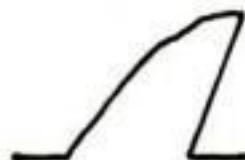
Why You Can't Fool the Radar Cops

minute warning, maybe a quarter-mile ahead of the cops—and that only if you're heading into the beam. If you come the other way, the detector will not whistle until the radar is clocking you.

Doesn't radar ever goof? Hardly ever. It is guaranteed to read right within two miles an hour. If the thing goes wrong, it goes wildly and noticeably wrong. It is set up pointing almost straight down the road. The deviation from "straight down" introduces some error—negligible in amount, and favoring the motorist anyway.

How does the radar pick you out? In heavy traffic, you might pass the beam along with a whole platoon of cars. But—the cop looks. He can see which car is moving fastest. And the radar is designed to gauge only that one.

But suppose it's a narrow road and two cars pass in opposite directions? Then the cop can't tell so easily just by looking. But usually he has a recorder hooked to the radar. And its pen makes different-shaped pips for cars going in different directions. The pip for a car heading toward the radar starts up gradually, then drops abruptly as the car passes out of the beam, like this:



A car entering the beam from behind makes a pip with the opposite shape, up sharply and down gradually, like this:

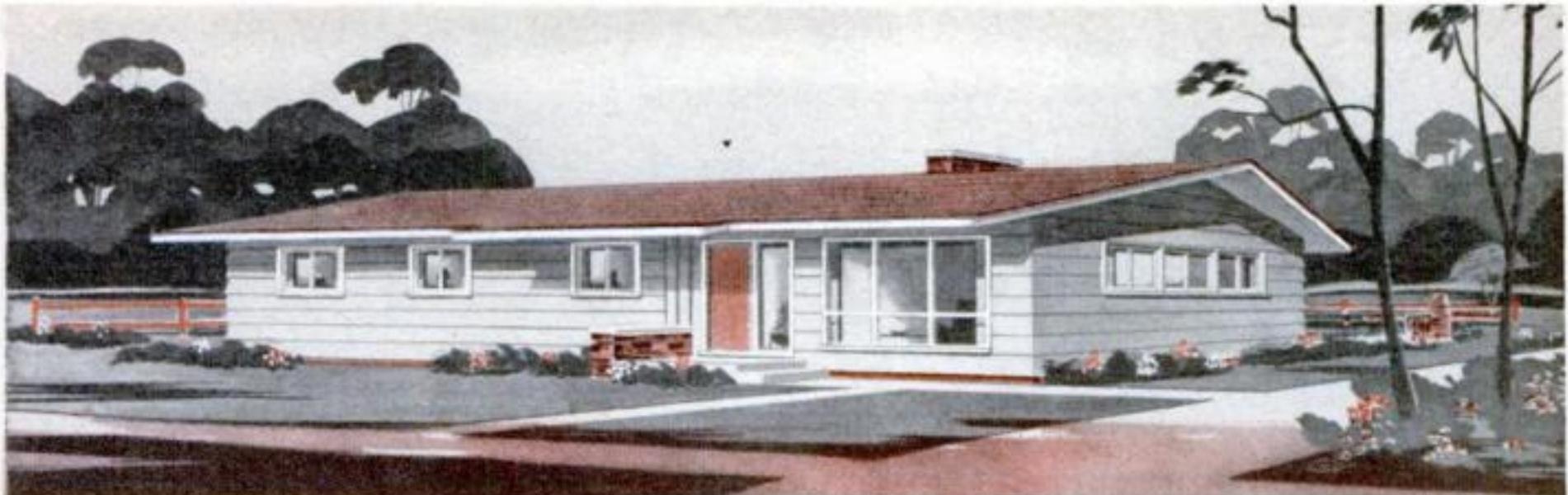


Is it fair? Well, how fair is speeding, which can endanger innocent lives? The courts consider radar a perfectly legal tool, like a speedometer, for gathering evidence against lawbreakers.

Still, there's an engineer out in California who is fighting radar on the ground that it violates the U. S. Constitution. He claims it's search without a warrant (forbidden by the Fourth Amendment). Most officials don't give him a Chinaman's chance of winning.

One oft-tagged motorist put it succinctly, if sadly: "You can't beat radar because it's accurate—and because they hide it."

END



ALADDIN READI-CUT HOMES

from
\$3,000 to \$10,000
WE PAY THE FREIGHT

Build your own home
ALADDIN
homeowners have saved up to
\$5,000
using our Readi-Cut Materials

Highest quality — Choice of 115 Modern Floor Plans



During the past 53 years Aladdin has sold more Readi-Cut Homes than any other pre-cut house manufacturer. Aladdin Readi-Cut Homes have been built in all 49 states and 38 foreign countries. Today, thousands of these homes are as sound and livable as they were 50 years ago. The reason: — High Quality Material plus Sturdy Construction. You enjoy Economy, too, through Aladdin's tremendous Buying Power and Advanced Manufacturing Methods. And you can save up to 30% on labor by doing all or part of the work yourself. More than half of our customers build their own Aladdin Homes. All material is precision cut in our mill — ready to use. Easy-to-read blueprints and special instruction book simplify every step. Aladdin offers the latest designs—5 to 8 rooms—Colonial, Ranch, Cape Cod, Split Level, and 2-Story. Mail coupon today for our beautiful 72-page, full color, 1959 "Book of Homes".



Highest Quality — Best Construction



Mail to THE ALADDIN COMPANY, Bay City, Michigan

I enclose 25c for your 72-page

L-44

BOOK OF HOMES

NAME _____

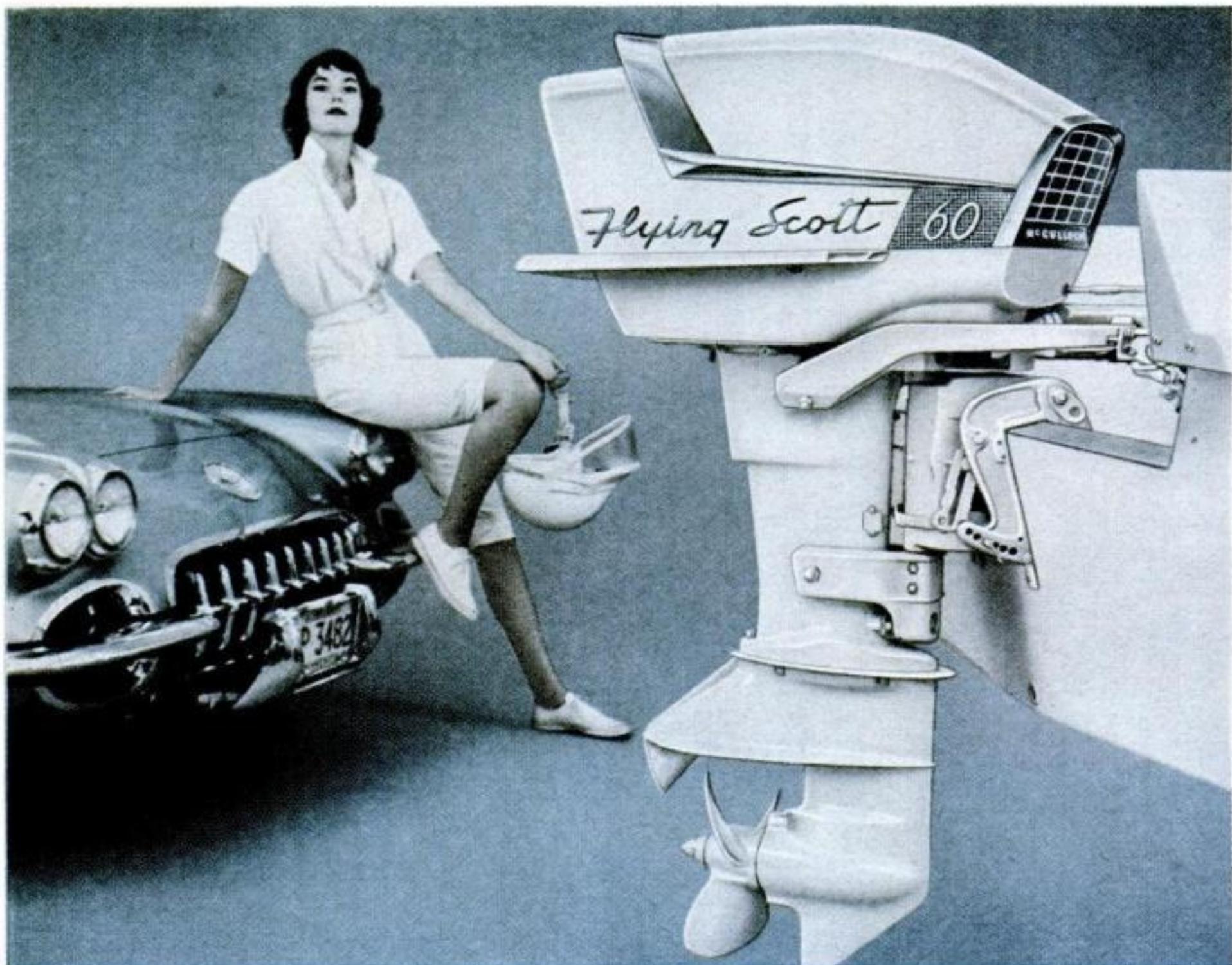
STREET _____

CITY _____

ZONE _____ STATE _____

PLEASE PRINT NAME AND ADDRESS

Win a new SCOTT



Leaves all other outboards years behind!

*Full electrical system
with generator, full gearshift
...the 60 hp. Flying Scott*

Your looking at the most exiting new outboard in America. Rugged as an Amry mule. Compact as a wacth. Lean and light enuogh to fit a wide range of boats—even in pairs!

With only three clyinders, the Flying Scott delivers a strong 60 horsepower* that planes big cruisers, tows water skiers effortlessley—sends runabouts flying at up to 50 mph.! The secret: a bold, simple new

*OBC certafied at 4800 rpm.

design that cuts virbration, and deliverys more smooth power at the porpeller.

Yet for all its ligthning, this sweet sixtey handles as easly as a new car. You start it with the turm of a key (full elecrtical system with generator is standred, no exrta cost). As you criuse, the new offset lower unit countracts propeller torque for easier steering. New Single Lever Control (otpional, extra cost) snychronizes you're throttle and full marine gearshift, gives you safe, sure comand of your boat. And Scott's bail-a-matic pump bails your boat —automatically! \$950, frieght extra.

MARINE PRODUCTS DIVISION **McCULLOCH CORPORATION**



Minneapolis 13,
Minnesota

OUTBOARD in the \$50,000 SCOTT SPELLING BEE!

FIRST PRIZES

10 electric-starting 60 hp Flying Scotts!

SECOND PRIZES

15 electric-starting 40 hp Royal Scotts!

THIRD PRIZES

20 electric-starting 25 hp Scotts!

FOURTH PRIZES

25 10 hp Scotts!

FIFTH PRIZES

30 7½ hp Scotts!

If you buy a Scott outboard during May, 1959, you may choose to have double the purchase price refunded to you in place of your regular prize.

Here's all you do to enter:

Just count the number of misspelled words in this advertisement. Enter that number in the coupon below. Fill out the rest of the coupon, completing the statement, "I would like to own a 1959 Scott outboard because . . ." in 25 words or less. Then bring your entry to any Scott outboard dealer. It's as simple and easy as that—and you may win a wonderfull new Scott outboard!

CONTEST RULES

1. To be eligible for consideration for a prize, entry must show the correct number of misspelled words in this ad, and be accompanied by a completion of the statement "I would like to own a 1959 Scott Outboard because . . ." in 25 words or less, together with the name and address of the entrant and be delivered to a Scott Outboard dealer no later than May 31, 1959.
2. Each person will be allowed only one entry. Persons sending in more than one entry will be disqualified. Only one prize will be awarded to a family.
3. The contest is open to anyone in the United States except employees of the McCulloch Corporation, Scott Outboard dealers, distributors or salesmen, their advertising agencies and their families. The contest is subject to all Federal, state and local regulations.
4. The number of misspelled words will be authenticated by independent judges using the latest Webster's unabridged dictionary. Prizes will be awarded from among the eligible entries on the basis of originality, sincerity and appropriateness of the completed statement. In case of ties, duplicate prizes will be awarded.
5. All entries become the property of the McCulloch Corporation to use as it sees fit. None will be returned.
6. For a list of the prize winners, attach to your entry a 4¢ stamped envelope addressed to yourself.

OFFICIAL ENTRY BLANK

TAKE TO YOUR NEAREST SCOTT OUTBOARD DEALER

I count _____ misspelled words in the Scott Spelling Bee advertisement.

NAME _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

"I would like to own a 1959 Scott Outboard because . . . (25 words or less)



Simplifies Complicated Measuring

**A New Precision Instrument
for Leveling and Incline
Measurement**

HOPPY

SPLIT IMAGE TRANSIT

**Accurate,
Inexpensive,
Simple to Operate**

**Only
\$6.95**

Optional—
also
available
for the
thousands
of Hoppy
Transits
now in use—
sturdy carry-
ing case \$3.25

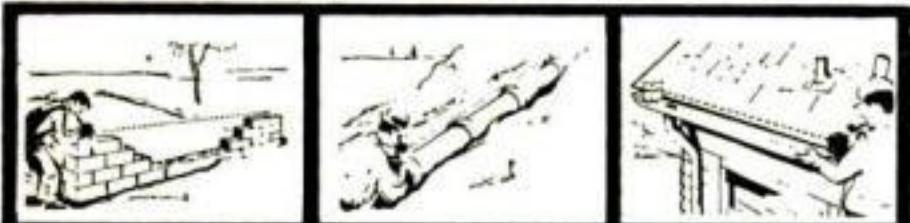
Easy as a camera to operate! One man—ALONE—can do leveling and incline measuring. Accurate to a fraction of an inch. Many uses on the job and around the house.

Carpentry Leveling
Patio & Terracing
Duct Installation
Foundation Work

Contour Plowing
Brick Laying
Yard Grading
Irrigation

Guttering
Drainage
Masonry
ETC.

Guaranteed Product Satisfaction



If not available at your Building Supply or Hardware Dealer, write directly to:

HOPKINS MANUFACTURING CORP.

Dept. PS-3

Emporia, Kansas

Another Quality Product by HOPPY

What We're Learning from Animals

[Continued from page 75]

keys usually change partners every few days.

On the other hand, elephants, beaver, deer and many kinds of birds may keep the same mates for several years in a row. Foxes, like wolves, tend to stick to one partner for life. But in these cases it is usually the male that insists on fidelity.

Apron-string instinct. To teach babies to stay close to their mothers, evolution has produced in some animals a remarkable mechanism called imprinting. It is seen best in certain wild birds, such as the graylag goose. The newly hatched gosling instinctively follows the first large moving object it sees. Normally, this is its mother, and after the gosling has followed her for a few hours, its mind is imprinted with her image, and the attachment becomes permanent.

If, instead of its mother, the first large moving object seen is a man, the baby animal follows this person about as though he were its mother, and ever after is attached to the human species. It's just like Cupid's arrow: The baby falls in love with whoever or whatever it first sees moving about near it.

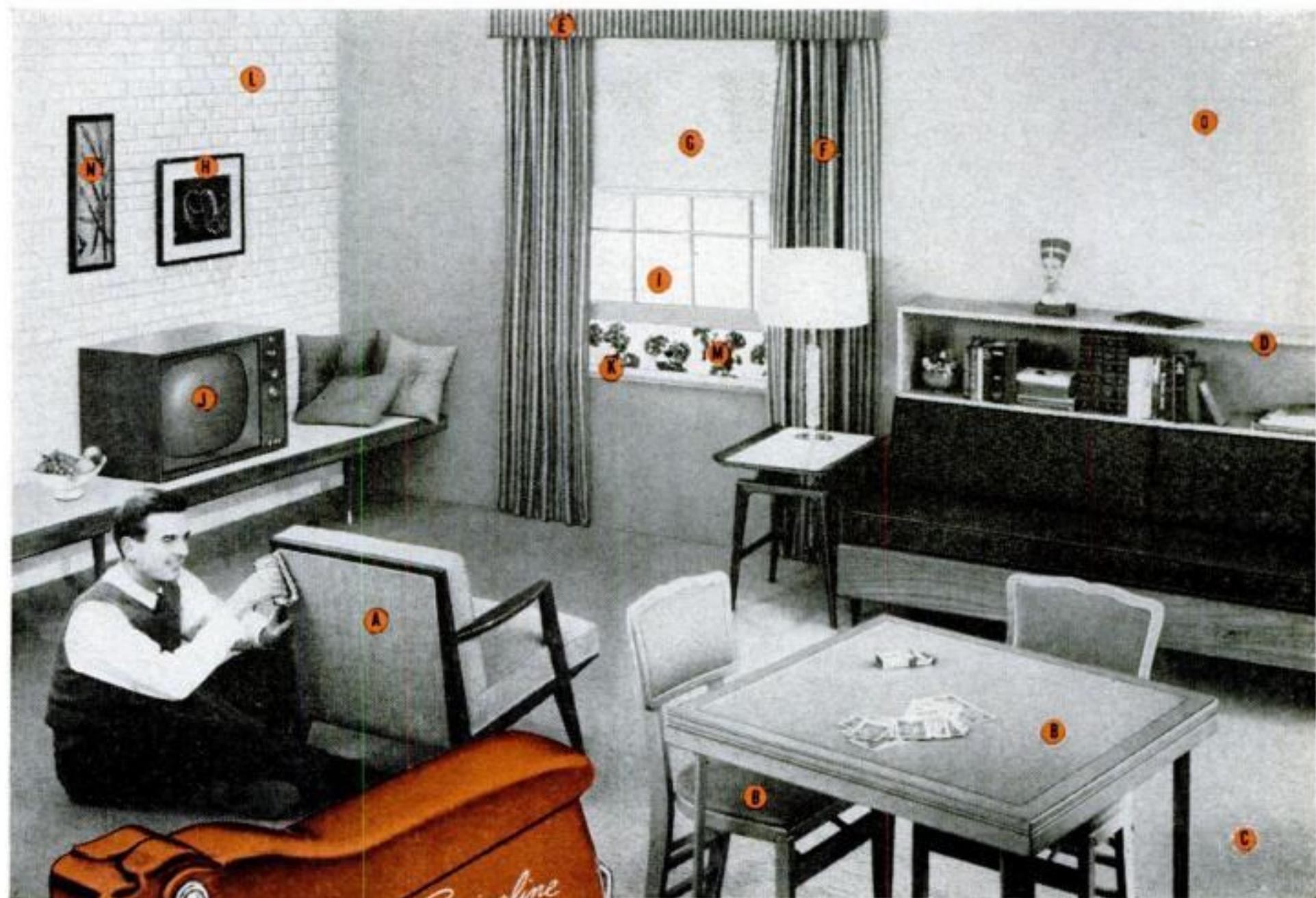
In many other animals, something like imprinting happens, but much more gradually. Dr. Scott believes that in all highly social animals there is a critical period, early in life, when social relations are most easily formed. The baby animal becomes attached to whoever is around it during this period. In the dog, Scott suggests, the critical period begins around 20 days after birth and lasts four to seven weeks, and this is probably the best time for a man to make friends with a dog.

Sometimes the results when animals become attached to human beings are embarrassing or ludicrous. One African game-hunter was followed remorselessly by an antelope calf that happened to see him shortly after its birth, and even insisted on going hunting with him. Another African hunter, who drove past a new-born zebra, found himself followed by a baby zebra with a car-fixation.

The most famous case of this sort: Mary's little lamb.

An important discovery about instinct made in recent years is that heredity

See what you can do...easily, quickly ...with a SWINGLINE STAPLE GUN!



ONLY \$ **4.95** with
**PUSH-BUTTON
LOADING**

- Built-in • extractor
- Handle lock •
- Push-button • loading
- Rugged, heavy-duty • steel construction
- Load indicator •
- Open channel • takes 2 staple sizes:
1/4" and 5/16"

FREE! Send
for Booklet "Tips
for Tacking"
How to do many
stapling jobs.



Swingline®
World's Largest Manufacturer of Staplers For Home and Office!

CHECK THIS LIST

- A—upholstering furniture
 - B—recovering card table
and chairs
 - C—installing carpeting
 - D—shelf trimming
 - E—valances
 - F—hanging drapes
 - G—window shades
 - H—matting pictures
 - I—window screens
 - J—attaching TV antenna
 - K—weather stripping
 - L—installing plastic
wall brick
 - M—making window boxes
 - N—wall decorations
 - O—insulating
- And hundreds of other uses.

What We're Learning from Animals

can transmit even an ability to recognize certain things by sight.

For instance, a gosling becomes frightened the first time it sees a hawk flying overhead, but it has no fear of a goose. Experiments with models show that the gosling reacts to a moving, birdlike shape with short neck and long tail as to a hawk, to one with long neck and short tail as to a goose.

What about human beings? Do we inherit any such complex instinctive behavior? Possibly just one kind. This is the ability of an infant to recognize a human face and smile back at it.

Experiments have shown that the average human baby from about two to six months old automatically smiles when he is feeling comfortable and sees a human face turned toward him and moving. The motion may come from his mother's mouth opening in a smile, or from a nod. To make him smile, he must see two eyes and a nose facing him, not profile. But he doesn't have to see the mouth, as long as there's motion in the part of the face he does see. (Before two months, the average baby smiles occasionally and

at random. After six months, he begins to discriminate, smiling at his parents and staring or breaking into tears at a stranger's face.)

Is smiling inborn or learned? Psychologists aren't sure yet, but since even bottle-fed infants smile at faces, not at hands or bottles, it looks as if it's hereditary. For the human infant, smiling should have as much survival value as the hawk-recognition instinct has for the gosling. The way for a gosling to protect itself is to recognize a hawk and freeze or hide. The way for a human baby to protect himself is to make his parents love him. Hence, if natural selection has given us one single instinct, it is very likely that it is to smile back when someone smiles at us.

END

.....
Next Month: Anger can kill you or cripple you, wreck your marriage or health. When are you most likely to blow your top? And how can you handle this normal, healthy emotion to your advantage? Read "What Happens When You Get Mad"—in June PS.

THROW OUT



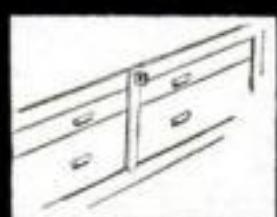
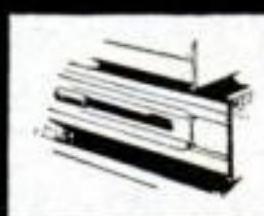
Write For Name of
Nearest Dealer

DEPT. PS-2

YOUR OLD CHEST

**for a new
KENNEDY
journeyman**

- 7 lined drawers, top storage, heat- and moisture-proof
- Rugged steel construction . . .



benchmate

- Machinist chest designed as a base for the JOURNEYMAN
- Large enough to hold 24" scale and 1/4" drill



Kennedy Manufacturing Company
Van Wert 2, Ohio

TIPS FROM TEXACO

Three ways to start a balky car

1 On damp or rainy days, moisture can "short circuit" your ignition system. When you can't get started on such days, try wiping dry the exposed parts of spark plugs, wiring, coil, distributor cap and points.

2 On wet *or* dry days, when your engine won't re-start, the trouble may be carburetor "flooding." To clear out the excess gasoline that may be present, slowly push the gas pedal to the floor—*don't pump it*—and hold down while you turn over the engine.

3 The exact reverse of carburetor "flooding"—not enough gasoline reaching the engine—may make your engine sputter and die over and over again. When this happens, pump the gas pedal *quickly*, four or five

times. This will squirt a charge of fuel into the carburetor.

If everything fails and you must be towed or pushed, carefully follow your car manufacturer's instructions about how to set automatic transmission *before* you allow the car to be moved. And to *keep* your automatic transmission in tip-top operating condition, have it drained and refilled with Texaco Texamatic Fluid. It's the *heaviest duty* automatic transmission fluid you can buy! Texamatic gives you maximum protection against breakdown under the most severe operating conditions. Costs no more than ordinary automatic transmission fluids!

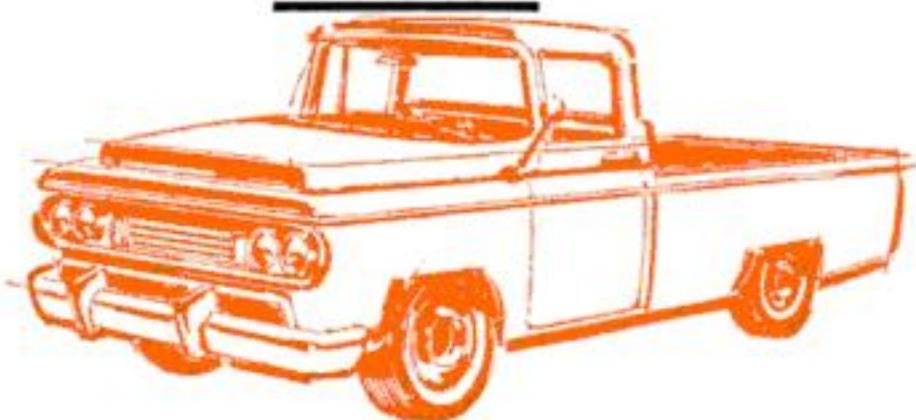


Buy the best...buy TEXACO



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HOW FLEET OWNERS GET 200,000 MILES FROM STOCK ENGINES



**Truck and cab operators replace key parts...
get like-new engines for worry-free driving**

Let's say you've got a good car you'd like to keep. Trouble is, it burns too much oil... can't get by a gas pump; and at traffic lights, you're left behind in a cloud of exhaust. Well, owners of fleet cars with stock engines *just like yours* know what to do. Invest in an engine overhaul, replace key parts like bearings and rings, and get a car that runs as good as new!

WHEN TO OVERHAUL?

Worn engine bearings are easy to diagnose. Among other things, they cause oil burning, engine misfiring and knocking, poor gas mileage, sluggishness and loss of power. Spot the symptoms in your own car? You need an overhaul, and new Federal-Mogul engine bearings.

WHAT TO REPLACE?

An "overhaul" without new engine bearings is no bargain—you can tell after a few miles. Then you put up with it, or pay to do the job over. So make it *right* the first time! It costs just a few dollars more, and it's worth every cent of it.

WHY FEDERAL-MOGUL?

Your engine depends on bearings—main, connecting rod and crankshaft. Federal-Mogul

bearings are the world standard for quality and precision. Yet it costs no more to use the best! Ask your mechanic.



FEDERAL-MOGUL SERVICE

Division of Federal-Mogul-Bower Bearings, Inc. • Detroit 13, Michigan



Learning to Live with the Sonic Boom

[Continued from page 118]

- Light bric-a-brac may be shaken or vibrated from shelves.
- Loosely latched doors may be pushed open and damaged.
- There is a possibility of aggravation of existing plaster cracks only when extensive damage is present.
- Structural damage to foundations and load-bearing walls is practically impossible.
- No sonic-boom pressure is strong enough to injure a person.

For the Air Force, the problem first got critical in the New England area when the Lockheed F-104 interceptors were made operational at Westover Air Force Base, in Massachusetts. There are other areas: central Ohio, the St. Louis region, central Texas, and southern California. All of them involve military bases and aircraft-manufacturing plants.

The biggest problem in 1959 is the Convair B-58 Hustler, our first supersonic bomber. So far, the B-58's sins against the countryside have been minor—disturbances created at irregular intervals by test pilots. Before this year is over, however, the airplane will be operational with the Strategic Air Command and flying regular practice missions all over the United States.

Boom in your future. About 30 cities, many of them major metropolitan areas, will be used as targets in simulated bombing raids at supersonic speeds. It will not always be the same 30 cities. In most cases there will be ample notice to the public, via newspapers and radio.

Don't get the idea that the boom problem is going to remain forever the charge of men in uniform. The nation's airlines are giving it more and more attention as transport designers turn from their first subsonic jets to the idea of a Mach 2 or Mach 3 passenger liner.

The airline problem, however, is several years in the future. The military problem is here today.

Most of the people made unhappy by sonic booms have assumed that they are not necessary, are caused by aerial hot-rodders and clowns in cockpits.

Sonic booms are characteristic of supersonic missions flown for serious reasons. They are unavoidable. They are the Sound of Security.

END



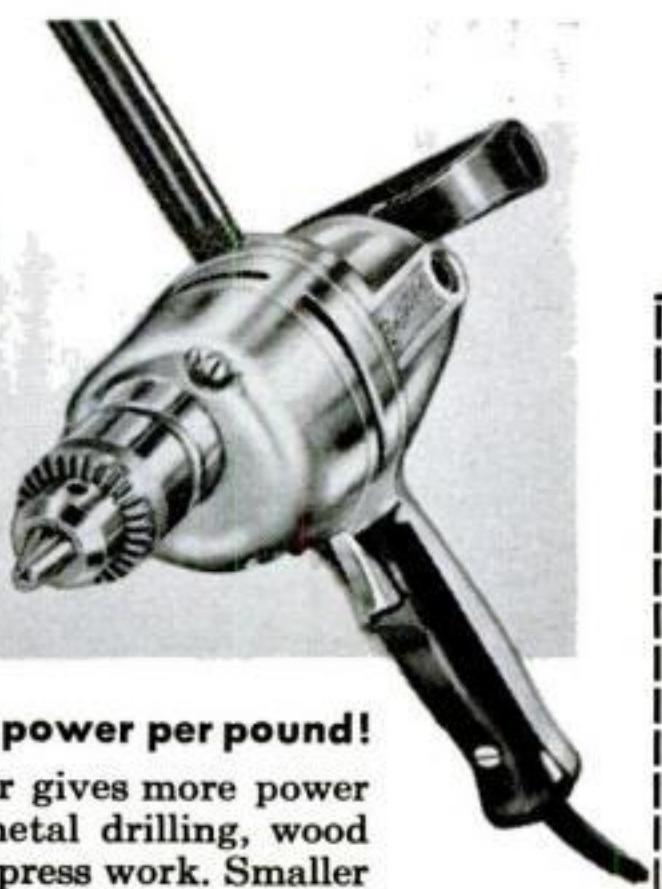
SO DUSTLESS, YOU CAN
SAND AND PAINT SIDE BY SIDE!

NEW BLACK & DECKER DUST-LESS FINISHING SANDER

Get set for the cleanest sanding you've ever done! Fine, satin-smooth surface in 1/10 the time of hand sanding! Easier sanding *with*, *against* or *across* the grain! And truly efficient, healthier dustless operation! The new B&D Dust-Less Finishing Sander connects to

your vacuum cleaner to whisk away dust as it forms, leaves a clean working surface. You can even sand and paint in the same area! Ask your B&D dealer now to demonstrate the new B&D Dust-Less Finishing Sander or send coupon below for full details.

NEW ½" B&D DELUXE UTILITY DRILL



With 84% more power per pound!

New B&D motor gives more power per pound for metal drilling, wood boring, and drill press work. Smaller and lighter. All at same low price!

Black & Decker®

World's Largest Maker of Electric Tools



THE BLACK & DECKER MFG. CO.
Dept. S-059, Towson 4, Md.

Please send complete descriptive literature on
your new tools:

- Dust-Less Finishing Sander U-43
 ½" Deluxe Utility Drill U-21

Name.....

Address.....

City..... Zone..... State.....

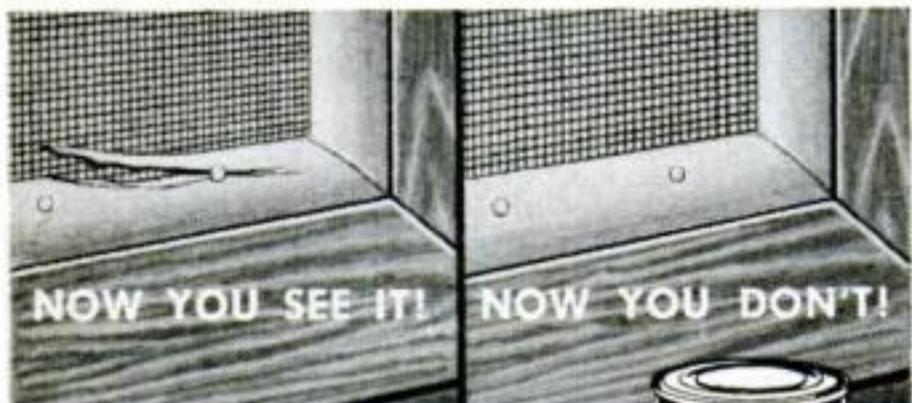
BALKY

MOWER?

QUICK! Speed it up fast with a few drops of 3-IN-ONE. Penetrates hard-to-get-at places. Doesn't gum up.

3-IN-ONE OIL
REGULAR • OIL SPRAY • ELECTRIC MOTOR

SCREEN SPLIT?



Easy! No skill required. Won't chip or crack! Nothing like it to resist water, weather!



For surest results always use GENUINE
PLASTIC WOOD
Handles like putty—hardens into wood!



- Remove old finishes easier, faster
- Non-inflammable and needs no afterwash
- For wash-off or scrape-off use

Heavy-Bodied KLEAN-STRIP

PAINT REMOVER

THE KLEAN-STRIP CO., INC.

2340 S. Lauderdale, Memphis 6, Tenn.



Handling the Power-Boat Traffic Jam

[Continued from page 112]

The cabin cruiser Hal-da out of Merrick reports itself adrift in the Short Beach channel, its propeller fouled by its anchor line. "November Sierra Golf Lima," the 36-footer on inlet patrol, takes her in tow and moors her at the nearest public dock—standard procedure in such cases. The Coast Guardsmen also follow the routine of boarding her and checking all safety equipment. Failure to have sufficient life preservers, lights, fire-fighting equipment, warning whistles and so on will mean written reprimands from District Headquarters. And repeated failures to heed these can mean fines and loss of the right to handle a boat at sea.

The lost are found. A teletype chatter almost continually on another wall of the nerve center, asking questions, offering answers, reporting on weather. "ANYONE HEAR MAYDAY ON 2182?" the teletype asks. "Mayday" is the international distress call on the distress frequency all stations monitor. "SHORT BEACH AND FIRE ISLAND BOTH HEARD IT," is the answer pecked back. "FIRE IS TRYING TO COMM WITH IT."

On the roll of yellow teletype paper, men in two stations miles apart try to figure out another puzzler—a lost boat. "WHAT I THINK POSSIBLE HE SIGHTED LAND AND SECURED RADIO OR HE SHIFTED TO 2638 KC TRYING TO GET SOME OTHER BOAT TO HELP HIM. WILL GO UP SEE," one reports.

"MAYBE HE IN GIN MILL," the other suggests—a reminder to the first station that "lost" boatmen have a predilection for tying up their boats and going into a shoreside saloon for a weekend bender without notifying their loved ones—who promptly call the Coast Guard to report all sorts of dire happenings. On the bulletin board over the Short Beach phone is an alphabetical list of telephone numbers for a wide range of local establishments from Ahern's Harbor Casino to the Viking Fishing Fleet. These spots are called during a missing-person search and more than a few "rescues" have been made where the "victim" has one foot up on a bar rail at the time.

Landlubbers ahoy! Two boys clinging to an overturned outboard are sighted off Rockaway Beach. A motor lifeboat



DECORATOR WOOD FINISHES DESIGNED TO FULFILL THE NEEDS OF EVERY HOME CRAFTSMAN

From sealing unfinished wood to creating "luxury wood" effects, you'll find REZ perfect for unfinished furniture, built-ins, outdoor furniture, carports, siding, fences and all home wood projects.

1

CLEAR SEALER AND PRIMER

Seals all wood, so that when you use REZ COLOR-TONES or paint you will avoid that "blotchy" appearance of dark and light areas which appear when color tints of any kind are applied on unsealed wood.



2

COLOR-TONES

13 DECORATOR COLORS

REZ Color-Toned sealers are the easiest, most economical, most richly beautiful finishes for siding, built-ins, fences, garden furniture, etc. One coat for interiors or two coats for exteriors seal and color.



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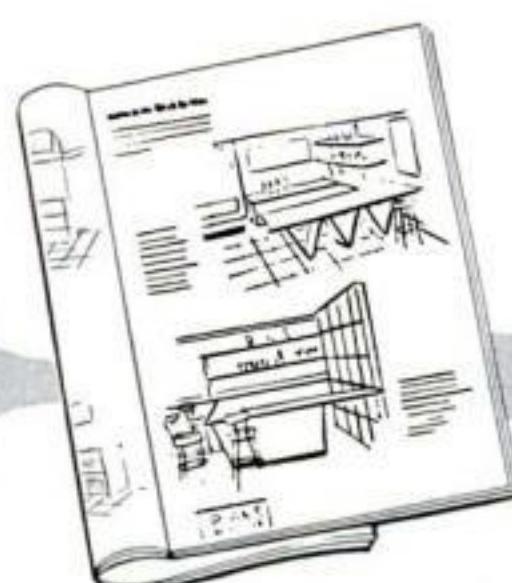
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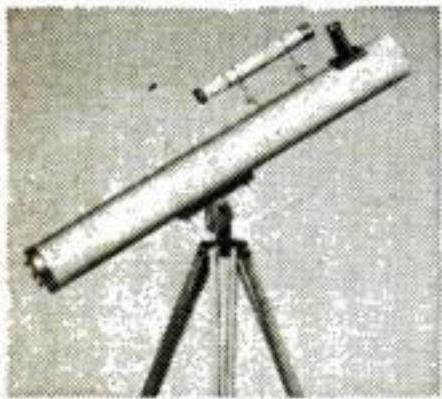


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Handling the Power-Boat Traffic Jam

churns to the scene, scoops them up and recovers the boat as well. It's rented—one of the watery U-Drive-Its that cater to landlocked amateurs anxious to get out on the water, amateurs who very often end up in the water, much to the Coast Guard's dismay.

"You could go out to sea in a washtub and we couldn't do a thing about it," Cinq-Mars confesses. "All we can do is lecture, and publicize, and talk and talk and hope that people will learn to have the respect they should have for both the sea and the boats they take out in it."

How to play safe. "If I had to make up my own rules of boating safety they would follow these general lines," Cinq-Mars says, his eyes focused out on the channel at the steady stream of watery traffic coursing in and out of the bay.

"Check the weather before you go out. Just call us; we'll tell you whether it's blowing or not. Every winter we lose a handful of duck hunters up in the marshes because they forget this simple thing. Out they go in a little boat, over she tips and down they go—gun, heavy clothing, boots, ammunition and all. We find the boat upside-down in the ice, the shotgun on the bottom. The hunters pop up in the bulrushes when the ice breaks in the spring.

"Let someone know where you're going and when you expect to be back. If you don't, we're either out looking for you too soon and unnecessarily—or too late because no one knew you were overdue.

"Have the right boat and a fully equipped one. These little outboards aren't meant for ocean going; keep 'em in shore. And have life jackets, lights, a horn—the bare essentials.

"Use your head. Sea water and booze don't mix. Neither do high speeds and heavy wakes in crowded mooring areas. Don't horse around. Do you know we've actually caught kids playing 'chicken' in outboards? Ridiculous!

"On water skiing, do it out away from boats, people and the beach. The trouble is, the kind of people who water-ski are often those who like to be 'seen.' They generally perform in the most crowded stretches of water.

"Most important, respect the sea. If you don't, she's liable to grab you and make you respect her."

END



The casting that caused a revolution in outboarDING!

It's just 33 pounds of metal—but by figuring out how to die-cast it, Johnson engineers brought outboarDing into the new age of "V" power.

AN INTRIGUING DREAM

Outboard motor designers had long been intrigued by the possibilities of adapting the "V" engine to outboard use. It offered many advantages: compactness, a short, strong crankshaft and balanced power impulses for smoother running. But the cast iron, automotive-type V-block was too heavy for outboard use.

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minum. With cast-in cylinder liners and main bearings it weighed only 33 lbs.!

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What You Don't Know About Your Job

[Continued from page 126]

in a publicly owned corporation is a hired hand who complies with the decision of other executives acting as a group. According to one authoritative estimate, the average management executive spends about six hours a day in conferences where policy decisions are made. After conferring all day, he often loads his briefcase with papers and burns the midnight oil at home. It's the only way he can clean up the work on his desk.

Should you quit if you don't like your job?

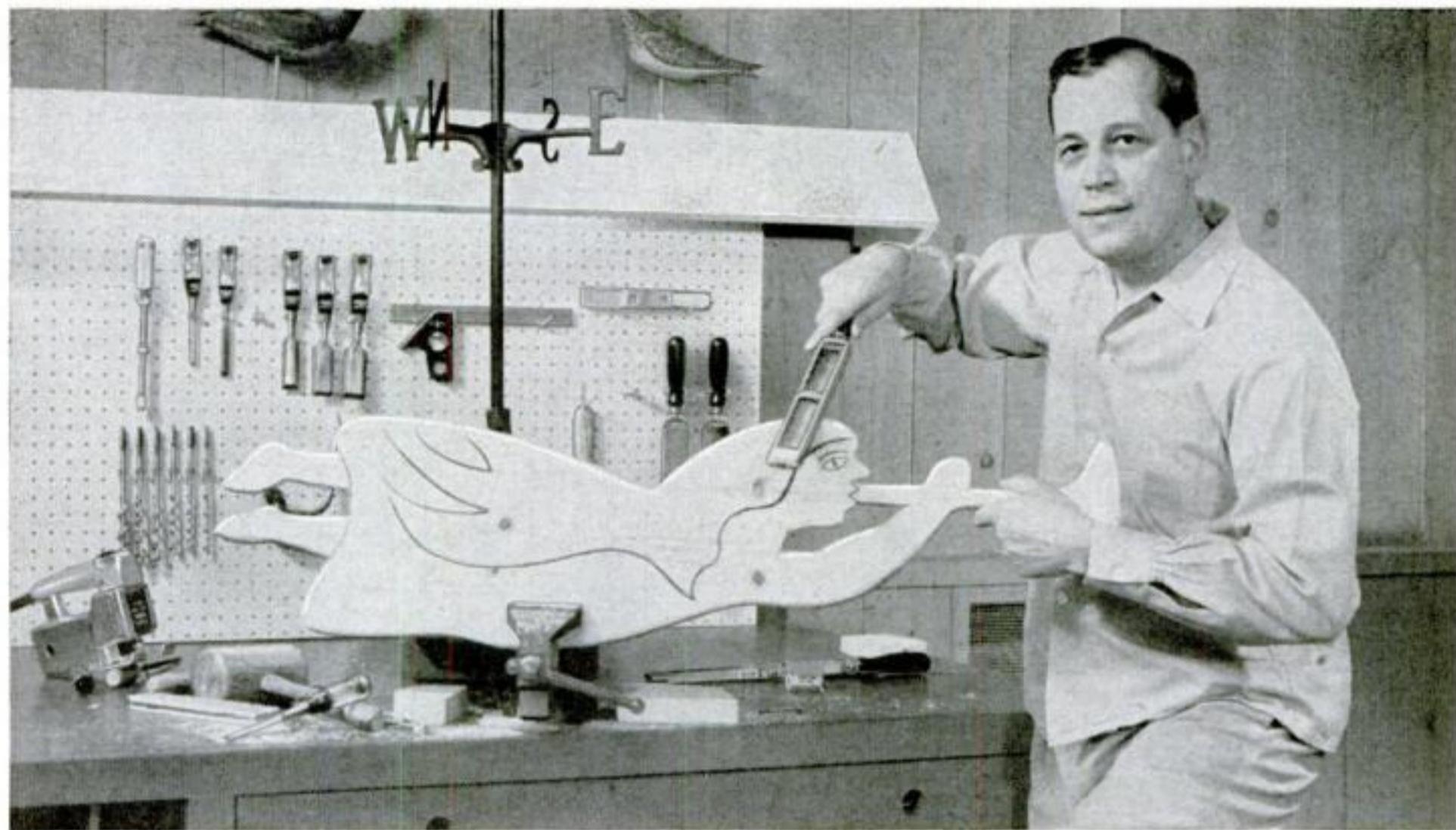
Researchers at the University of Kansas found that your best bet for ultimate success is to leave a job as soon as you're absolutely sure it doesn't suit you, and try for something more in your line. Of course there's a limit to the jumping around you should do. And your chances of achieving success by changing your line of work decrease with age. (If you switch careers after 45, the odds are strongly against your making a big hit in your new field.) But records of major executives show that they have held jobs in an average of three firms, so the man who sticks to one job for a lifetime probably is less likely to reach the top.

And don't worry that getting fired will leave a permanent black mark on your record. Actually, the boss who fires you from the wrong job—wrong for you—may be giving you one of the best breaks of your life, for personnel counselors agree that a person rarely succeeds at work he's not happy doing. Or, to put it another way, if you can find a job you get a kick out of, it's highly likely you'll make a success of it.

Finally, what's the most important factor in keeping you happy at your work?

Many researchers have established that it's the feeling that you are doing an interesting, challenging and useful job. For example, one survey showed that those most satisfied with their careers include the clergy, social workers, educators and writers—all notoriously underpaid, but all doing a job that gives them a sense of accomplishment.

END



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time handyman, I like Stanley SURFORM . . . it's a versatile tool."

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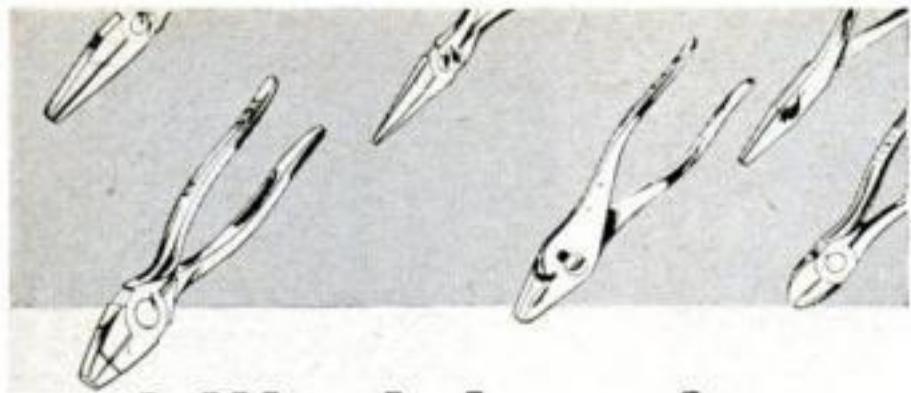
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See Stanley SURFORM. Try Stanley SURFORM. You'll want Stanley SURFORM in your shop. On sale wherever good tools are sold, or write to Stanley Tools, Dept. 6305 New Britain, Connecticut, for illustrated "SURFORM" folder.

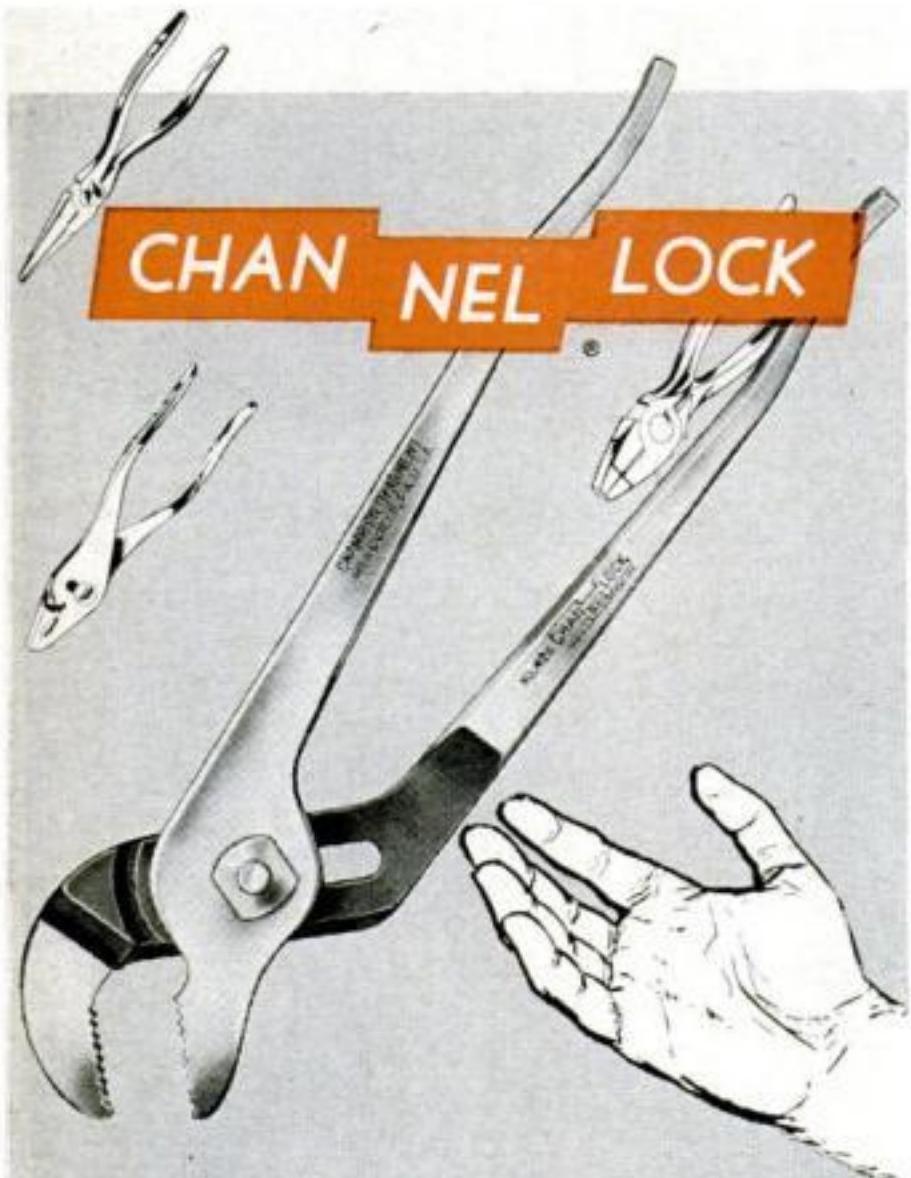
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**ASK YOUR TOOL SUPPLIER FOR
genuine CHANNELLOCK PLIERS**

The Tool Almost Everyone Uses *[Continued from page 154]*

head rake is gradually giving way to the bowhead. While the levelhead is actually cheaper and often lighter, its single stem is more easily broken under rough use. The bowhead provides a springiness that cushions shocks and lets you whack away.

Special rakes. Besides the midget "shrub" rakes, there are "floral" rakes that have only eight tines (instead of 14 or 16) and weigh only about $1\frac{1}{2}$ pounds. These are ideal for getting in around narrow flower beds.

There's even a special crab-grass rake. This has sharply curved saw teeth that are supposed to get under crab grass and snatch it right out of the soil.

Union Fork & Hoe puts out a handy adjustable rake. This is a steel fan rake that opens up to a fine, limber 20" spread for "brooming" your lawn. For heavier raking, or brushing gravel, you slide down a gripper bar that gathers the slender steel tines into a stiff, tough $1\frac{1}{2}$ " "comb."

How the experts know. Rake men have several ways of finding out how good a rake is. They can tell a lot by merely "hefting." Some feel clumsy and dull; others, lively and well-balanced.

To compare two steel lawn brooms, a rake man may lay them face down on the floor, step on the tines and see how far he can lift the handle. "Sometimes we can pull the handle up a full 90 degrees," says John Mack of the Disston Co. "Only good steel will stand this kind of punishment without springing out of shape."

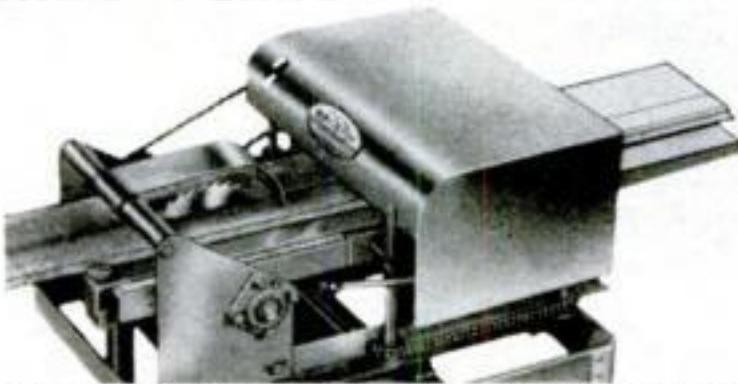
Another test shows whether all the teeth touch the ground uniformly under stress. A rake man holds a rake at "working angle" with teeth on the floor. Then he puts downward pressure on the handle. If any teeth spring up, look for another rake.

Many rakes are guaranteed, which surprises most buyers. Some people, but not many, take unfair advantage of this after abusing a rake. "We even have rakes come back after five years with the teeth worn to nubbins," says one maker.

Something that appalls the experts is the way many people hold their rakes. "They grab them like mine detectors," says one. "A good rake is made to balance. Take a grip farther down and let the rake work for you."

END

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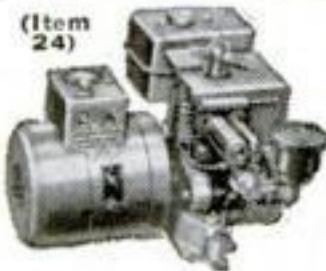
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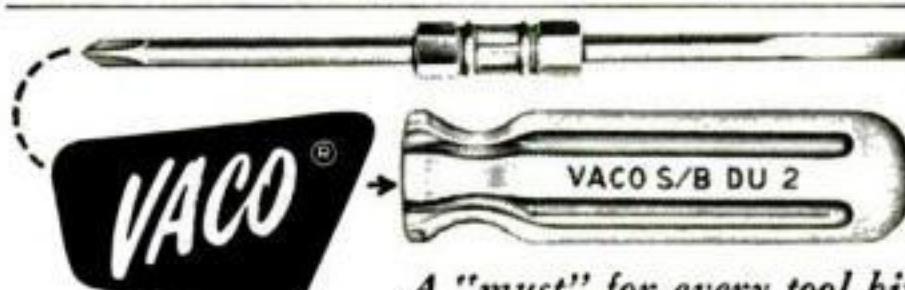
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Why Men Murder [Continued from page 90]

In *Society and the Criminal*, Sir Norwood East says, "Murder is rather frequently due to an intensely emotional situation operating suddenly upon a man who has always behaved in a perfectly normal manner except for the few seconds when the murder is committed."

Many a bridge player will understand why one perfectly normal man shot his wife dead some years ago when she led the wrong card. One serious student of murder suggests that while family life discourages suicide, its rubbing-raw from sheer intimacy may tend to encourage murder.

F. Tennyson Jesse, in *Murder and Its Motives*, says the true murderer is a colossal egoist—he's sure he can kill and get away with it. In his book, *Areas of Psychology*, F. L. Marcuse adds, "Low intelligence as a causative factor in crime has not been shown."

Jesse sets up six categories: murder for gain, revenge, elimination, jealousy, lust of killing, and from conviction. The last category covers homicide by the state—capital punishment.

The Marcuse book also lists six classifications of criminals: the accidental (the drunken driver involved in a fatal accident), the situational (he steals and maybe murders to get food), the irresponsible (the idiot), the neurotic (he murders because of a covert hatred of his father), the psychoid (unfathomable and unpredictable), and the professional.

Brooklyn's icy-eyed "Murder, Inc." to the contrary, the professional killer, to whom murder is a business, is only a small minority among murderers.

In *The Mind of the Murderer*, W. Lindesay Neustatter remarks, "... motive, without the whole background in which it is set, tells little of the criminal's psychology." He classifies murderers as the schizophrenic (with delusions of persecution), the hysterical, the mental defective, the paranoiac (victim of a systemized delusional insanity), the epileptic (with epileptic automatism and amnesia), the constitutionally unstable psychopath, and finally the chap who is simply depressed possibly due to low blood sugar (momentary malnutrition).

The cops have a pretty good batting average in apprehending suspects. Over

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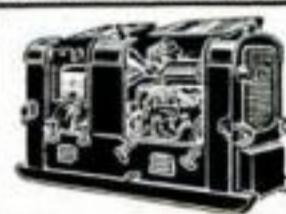
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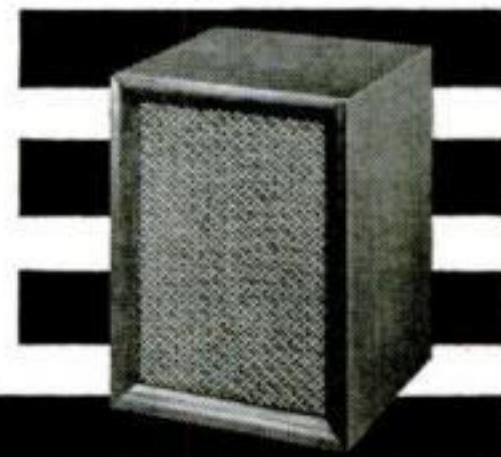
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Only two out of three persons arrested and formally charged with murder or non-negligent manslaughter are actually convicted of either crime or even a lesser one. A man charged with murder may, in the end, turn out to be merely naughty in the eyes of the law, due to extenuating circumstances.

Of 1,654 persons booked for the two top categories of crime and held for prosecution, in 198 cities of more than 25,000 population in 1957, only half were found guilty of the offense charged. An additional 297 were convicted of a lesser offense (negligent manslaughter, justifiable or excusable homicide, etc.). A third of the total, 536, went free—many of them, no doubt, because they were innocent.

While the tools of murder change little, the law and the public's attitudes do. King David murdered Uriah the Hittite to claim Bathsheba, and escaped scot-free except for "displeasing" the Lord. Solomon evidently regarded the Sixth Commandment as a vague religious injunction. The New Englanders who hanged the Salem witches would today be tried, themselves, for murder. Would Sacco and Vanzetti, Boston's anarchistic immigrants, be sent to the electric chair in 1959 on the strength of the questionable evidence of more than 30 years ago?

The good guys ventilated the bad guys with sixguns on America's frontiers and often escaped arrest. Maybe they had better character references. The killing of infants, invalids and the aged was accepted homicide among the Eskimos at one time because, when food was scarce, life was only for those who could earn their keep.

Murder is murder not only in its time and place but also in the murderer's own image of himself. For he can say with Shakespeare's Othello:

*"An honourable murderer, if you will;
For naught I did in hate, but all in honour."*

END

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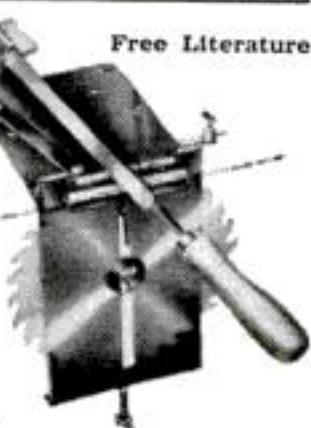
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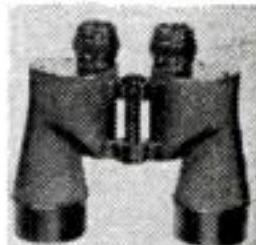


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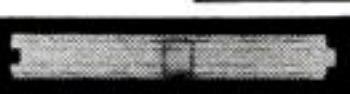
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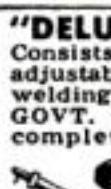


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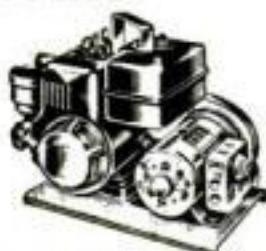


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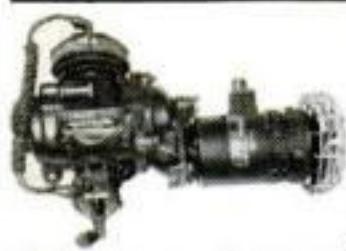
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Detroit Report

[Continued from page 64]

tives have been heard to admit ruefully—as one did two years ago in discussing his company's water-leak problems—that "it's a good thing we aren't building boats; all our customers would drown!"

Flying-squadron inspection teams, pilot production lines to pinpoint bugs before volume production begins, new inspection methods with more people using them are among tools now being used.

Heating problem. Projected use of an air-cooled engine in the upcoming GM compact car has caused those familiar with the problem of passenger-compartment heating to wonder how it would be solved. Reports are that a gas heater is being developed for this purpose.

Odds are this will be only an interim measure since economy will be a strong selling point of such cars, and gas heaters boost fuel consumption measurably.

One thing at a time, please. The auto manufacturers are doing a juggling act as between the compact cars, research for the future, and regular announcements on the '60 models. For the future—in a year or two—Chevy is readying a V-8 with an aluminum block for its larger cars. This has led to some confusion with GM's plans to use a part-aluminum pancake six at the rear on the compact car.

Announcements on the Big Three compact cars probably will follow this timetable: Chevy probably in September or as late as October if production kinks develop. Ford will follow closely. Chrysler's "Falcon" will come in January or later.

The juggling act also encompasses some "bigger" compact cars. Both Ford and GM have such versions. These likely will appear during the 1961 model-introduction season. Speculation that Ford's second job will replace current Edsels is current. GM's second compact model may be offered through Buick, Oldsmobile and Pontiac dealers.

Cause and effect. Budget cuts caused by low sales, together with expensive compact-car crash programs, will delay some engineering developments planned for the regular '60 models.

Fuel injection. Thompson Products has a system which it claims can be built for just under \$50 a copy in quantity. While no commitments have been made, GM is looking it over.

END

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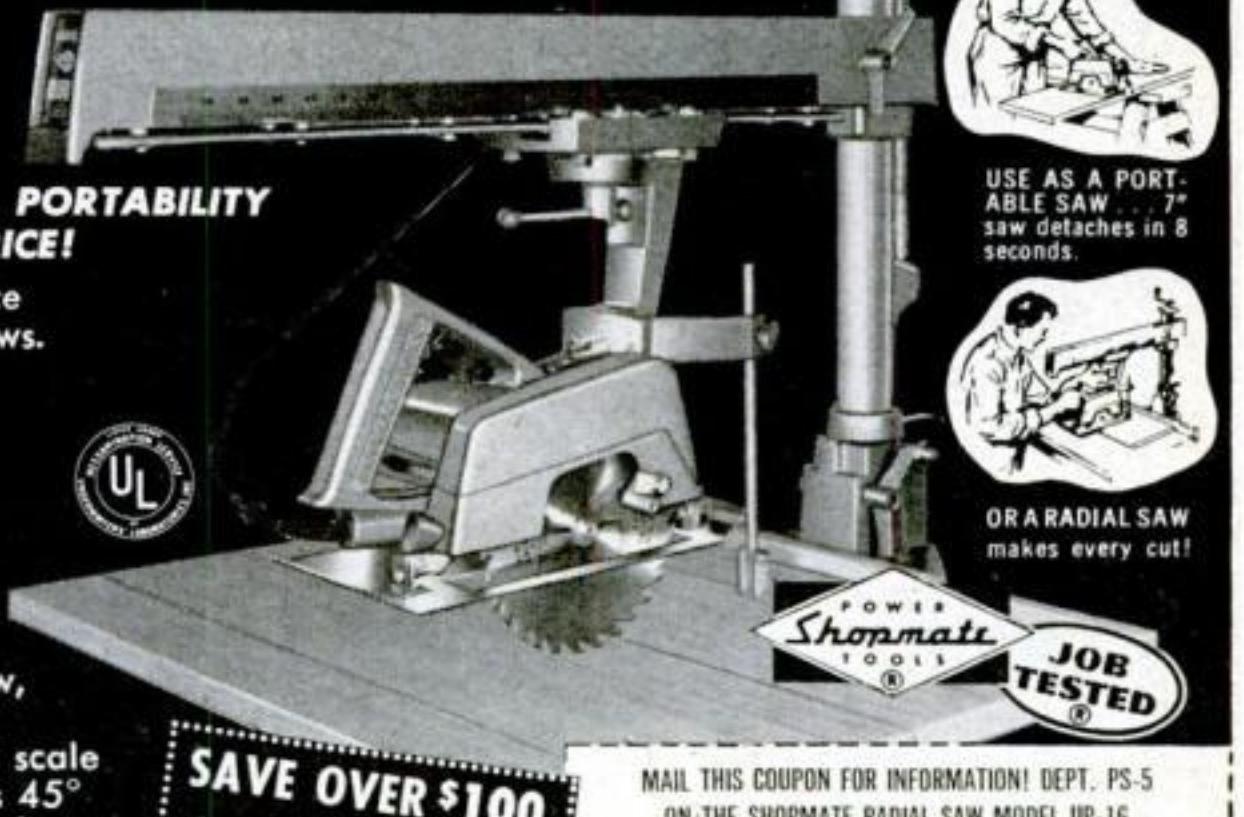
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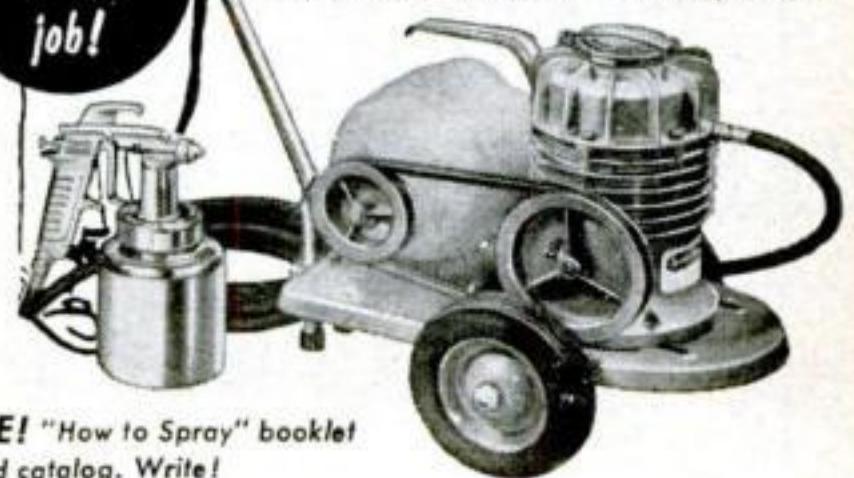
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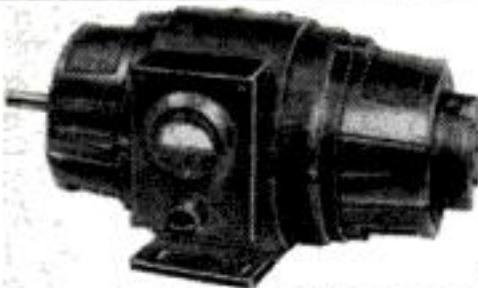
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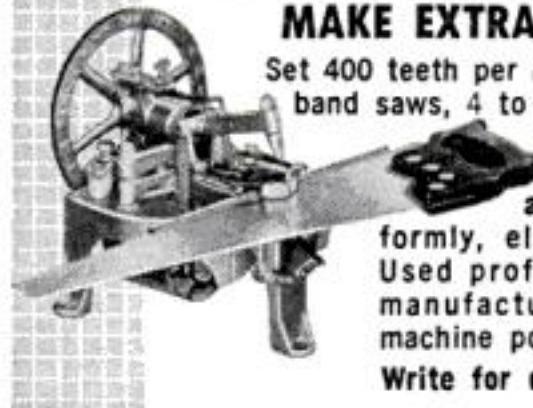
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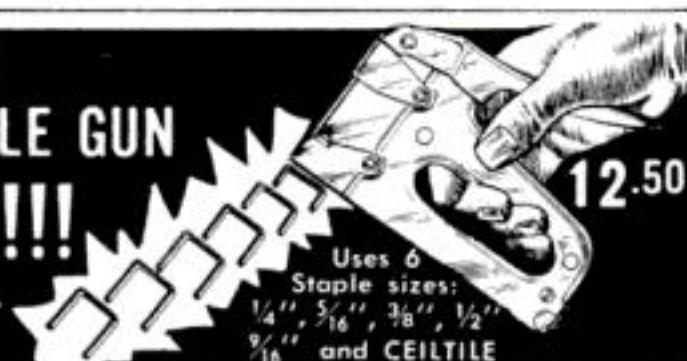
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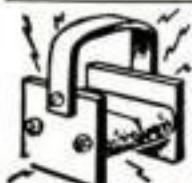
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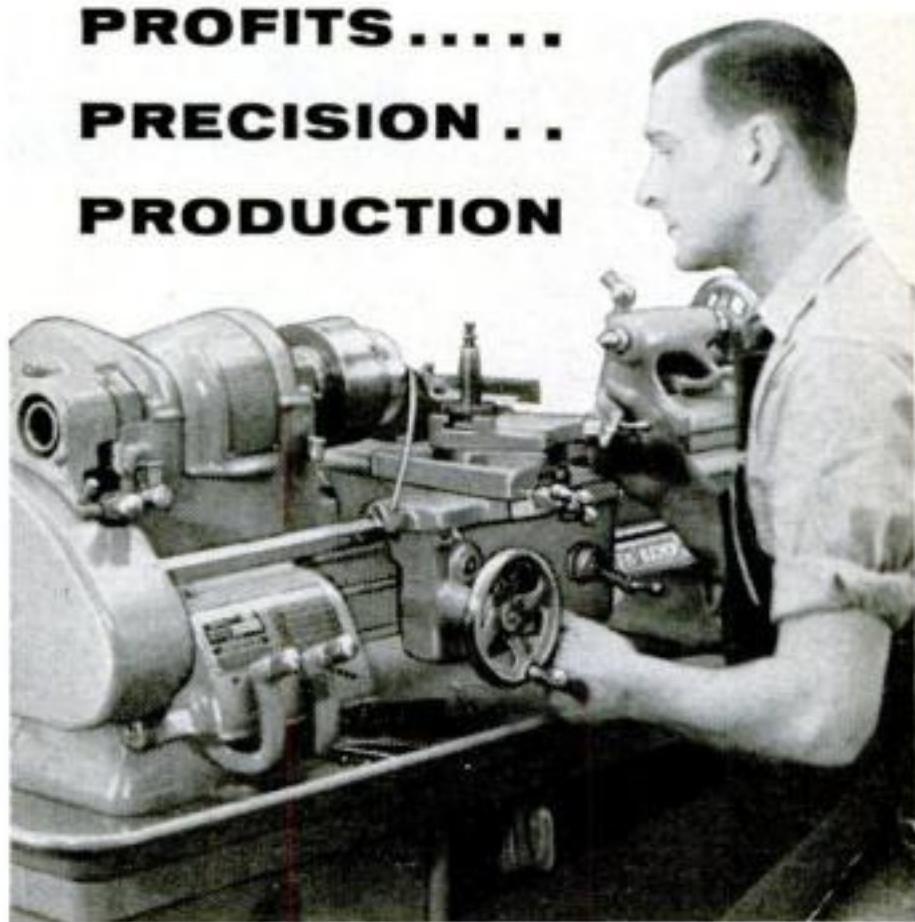
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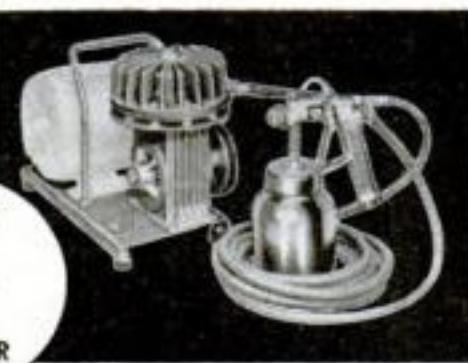
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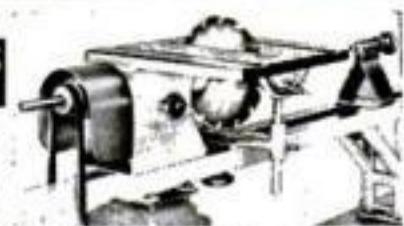
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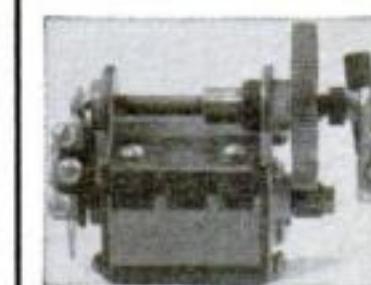
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Big Changes Coming in Auto Electric Systems

[Continued from page 96]

reasons why another step-up in battery voltage is undesirable.

Fast action. At 60 miles an hour, the rate of point operation is something like 200 times a second. If you step down on the accelerator to pass, driving at this speed, you may find that your engine doesn't respond, if you have failed to have a tuneup fairly recently.

Here's what happens:

When the contact points are closed, energy is stored up in the coil in the form of a magnetic field. When the points open, this magnetic field suddenly collapses, inducing a high voltage in the coil's secondary winding, which fires the spark plug. If the points don't stay closed long enough to build the magnetic field to a maximum, then there will be less voltage available to fire the plug.

To make matters worse, you need a higher voltage to jump the spark-plug gap when you are accelerating. Just at the time you need more spark voltage, there is less available to do the job.

Transistors to the rescue. There have been dozens of different ignition systems under development in the last year or two. Magneto and dual-breaker systems have long been used by the hot-rodders and racing cars. Dual points have even shown up on some production cars. But most of the alternative systems have been either too expensive, too complicated, or gave too little improvement for the cost.

The Electric Auto-Lite Company has introduced an ignition package which, they claim, will not only lift the ceiling placed on engine design by conventional ignition, but will give owners of today's cars the means of enormously improving the reliability of their ignition systems. The key to its operation is a transistor. It is a single-package unit only slightly larger than the ignition coil it replaces.

In demonstrations, the manufacturer has shown that this unit will:

- Deliver a constant high voltage of around 30,000 volts throughout the speed range of an engine.
- Give practically unlimited contact life.
- Eliminate engine roughness due to minor variations in timing caused by excessive arcing and bridging.
- End cold-weather starting problems

due to contact-point oxidation (blue points).

The packaged unit consists of a specially designed high-voltage transformer, a power transistor, its heat sink and associated circuitry. In operation the system is similar to conventional systems, except that the brunt of the task of interrupting the heavy primary current is taken over by the transistor. It can handle primary currents of eight amps with no problem of bridging and arcing. The transistor is triggered by, and engine timing is still controlled by, the mechanical contacts. But now they interrupt only a quarter of an amp.

With plenty of spark energy available, it will be possible to engineer ignition systems that will be practically immune to spark-plug fouling. These advanced systems should not be confused with the various "gimmick" spark plugs sold by quick-buck promoters.

One proposed system, already being made for military vehicles, uses spark plugs in which the spark takes place along the surface of a semiconductor. It actually works better with an accumulation of deposits than it does when clean. On tests, a high-compression engine with these plugs has operated at idle for 50 hours and still delivered peak efficiency at full throttle. Main drawback: cost.

Plugs with a series gap are a more likely prospect for passenger cars. A second gap, ahead of the one at the business end of the plug, keeps the high voltage from leaking to ground through the partially conductive deposits on the insulator nose. When the voltage builds up enough to jump the series gap, it jumps the gap in the combustion chamber simultaneously. It happens so suddenly that there is no time for leakage to ground.

The AC generator, transistor regulator, and transistorized ignition coil are all in production. They're not just someone's dream for a car of the future. As yet, they are a bit on the expensive side, but quantity production will bring the prices down. The experts are saying now that these developments in auto electric systems are the biggest steps in recent years toward an ultimate car that will run the first 50,000 miles without repairs. END

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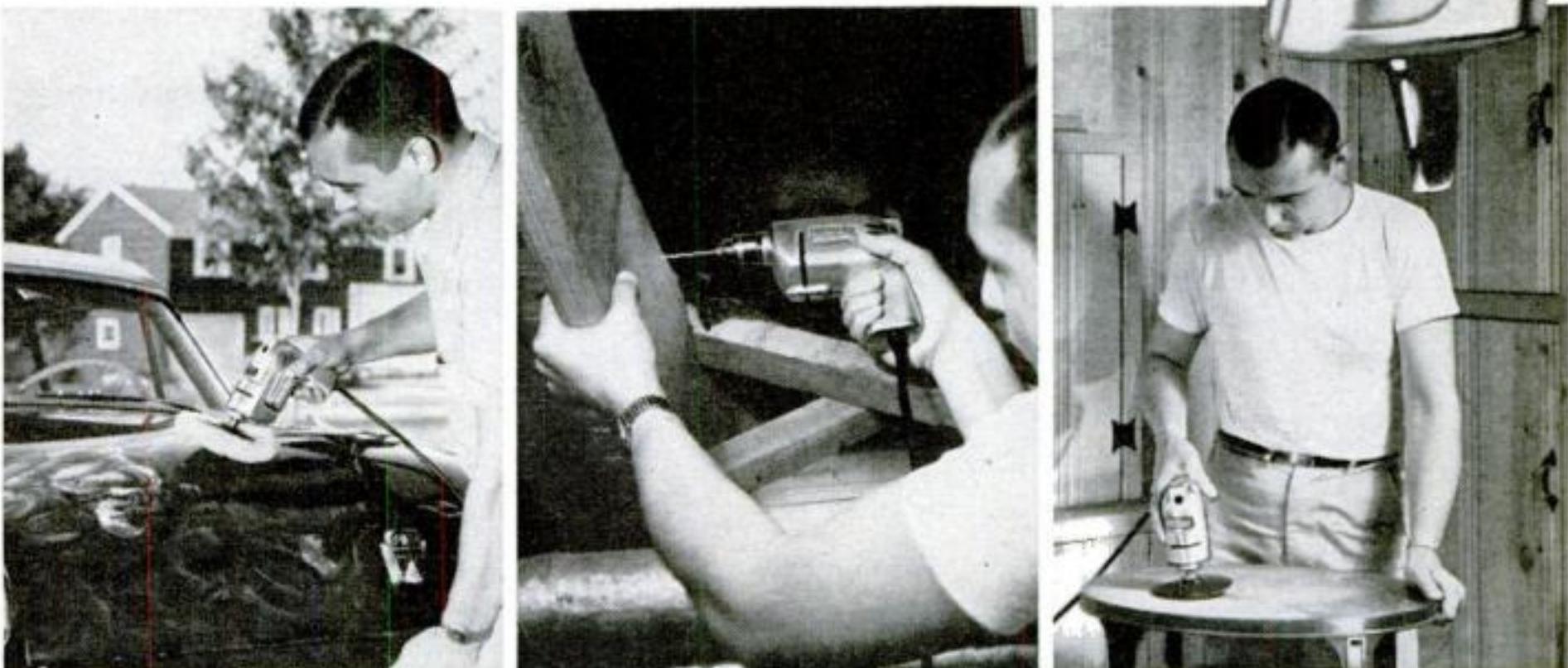


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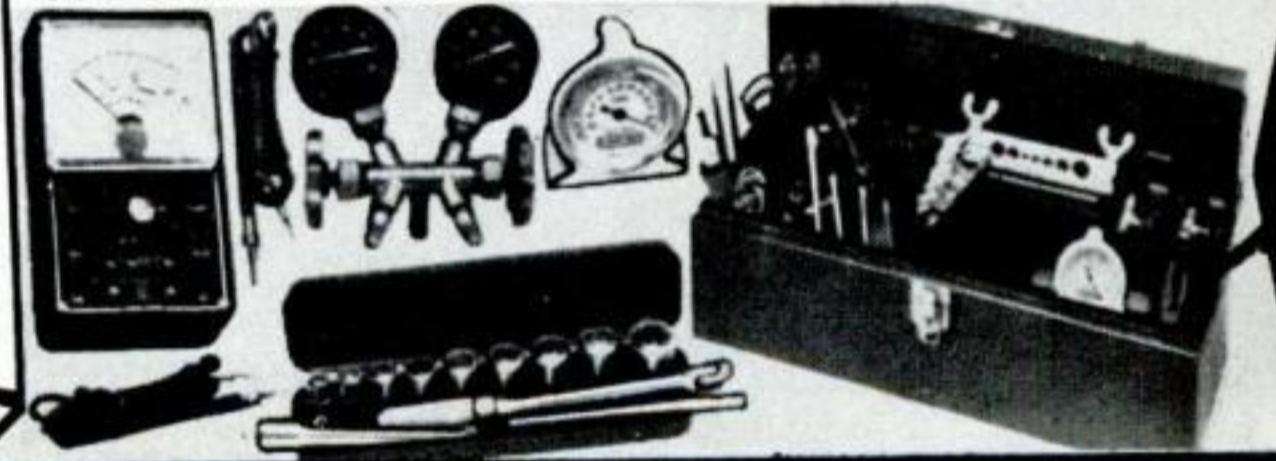
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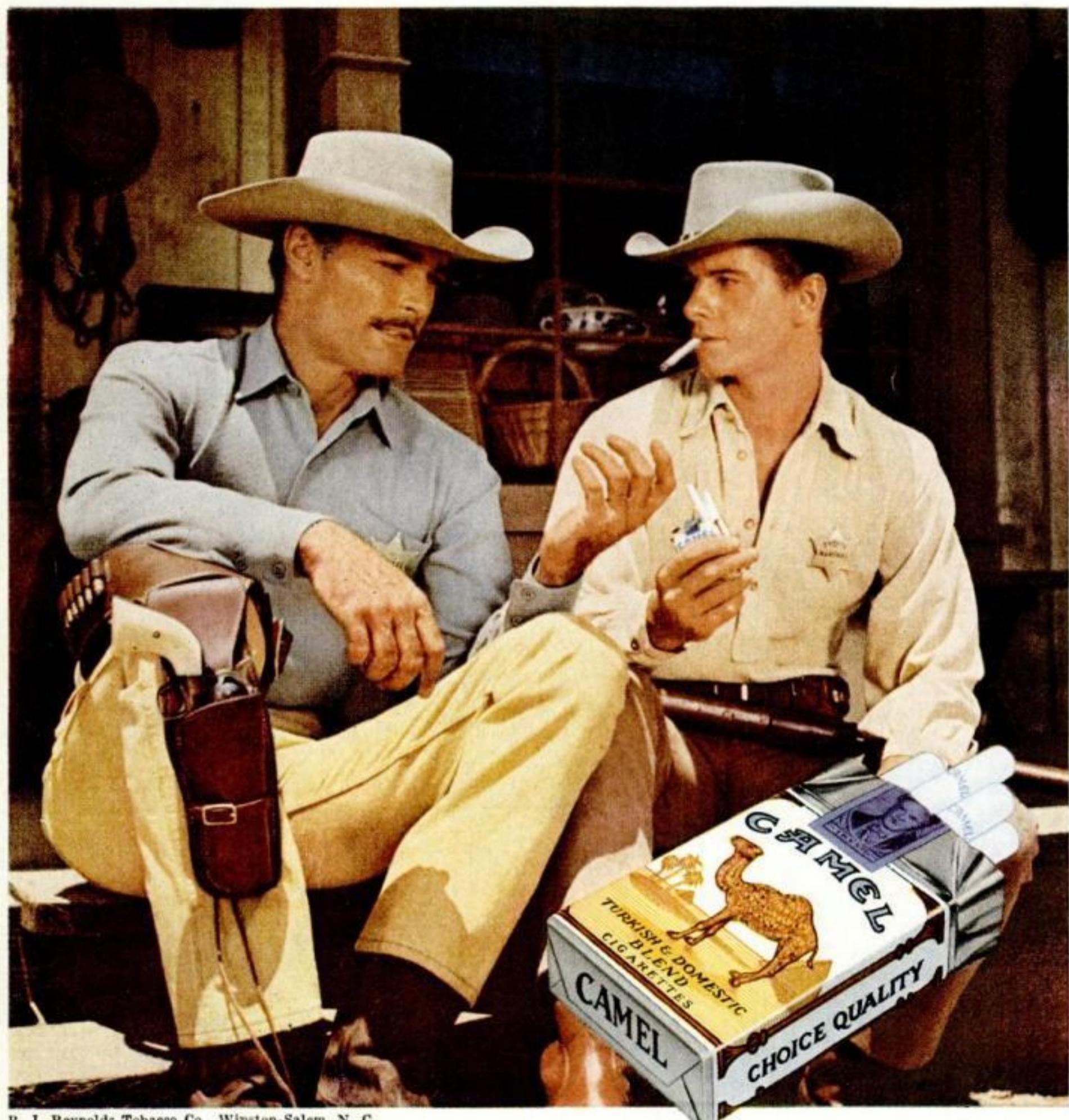
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